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INSTRUCTION MANUAL
MODEL T194C and T194CE
TRANSMISSION AND NOISE
TEST SETS

All Wilcom products are warranted against defects in materials and workmanship. This warranty applies for a period of one year from date of delivery, except in specialized cases where a different period may be specified for particular items.

Wilcom's obligation under this warranty is limited to servicing or adjusting each instrument returned to its factory within the warranty period, and to replace any components which are found to be defective. If in Wilcom's judgement the defective condition is a result of misuse or abnormal operation, repairs will be billed.

If faulty conditions develop, notify Wilcom for instructions. Servicing information will be supplied wherever possible. If the equipment is to be returned for repairs, please include a description of the faulty condition and who should be contacted if additional information is needed. Ship the equipment prepaid.

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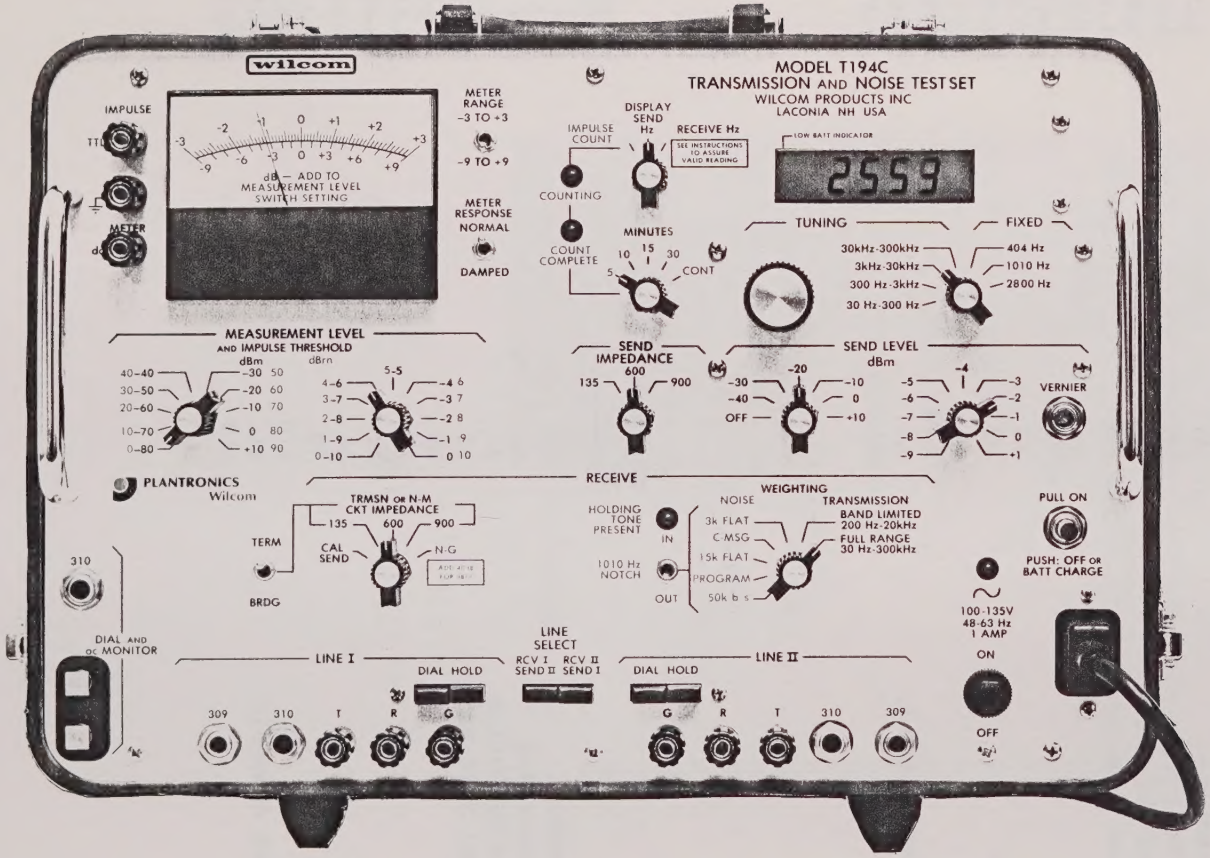


FIGURE 1-1

Model T194C Transmission and Noise Test Set

1.0 GENERAL DESCRIPTION

1.1 Description

1.1.01 The T194C (North American Measurement Standard) and the T194CE (CCITT) Transmission and Noise Test Sets are designed for rugged, portable and reliable, general-purpose testing of voice frequency, program and data circuits up to 50 kb/s. The frequency range covered is 30 Hz to 300 kHz. Included is a comprehensive set of weighting circuits plus a notch filter for measuring noise with tone. Transmission level measurements for both models are made either on a broadband, 30 Hz to 300 kHz, basis or bandlimited to minimize the effects of noise outside the band of interest.

1.1.02 Both test sets contain a low-distortion tone generator which may be tuned in four ranges from 30 Hz to 300 kHz or may be set to one of three switch selectable fixed frequency. A liquid crystal display shows the send or receive frequency or, as an event counter, impulse count. Switching is provided for measuring, sending, or dialing a test line on either of two lines.

1.1.03 The T194C and the T194CE may be operated on ac line power or from internal rechargeable nickel-cadmium batteries.

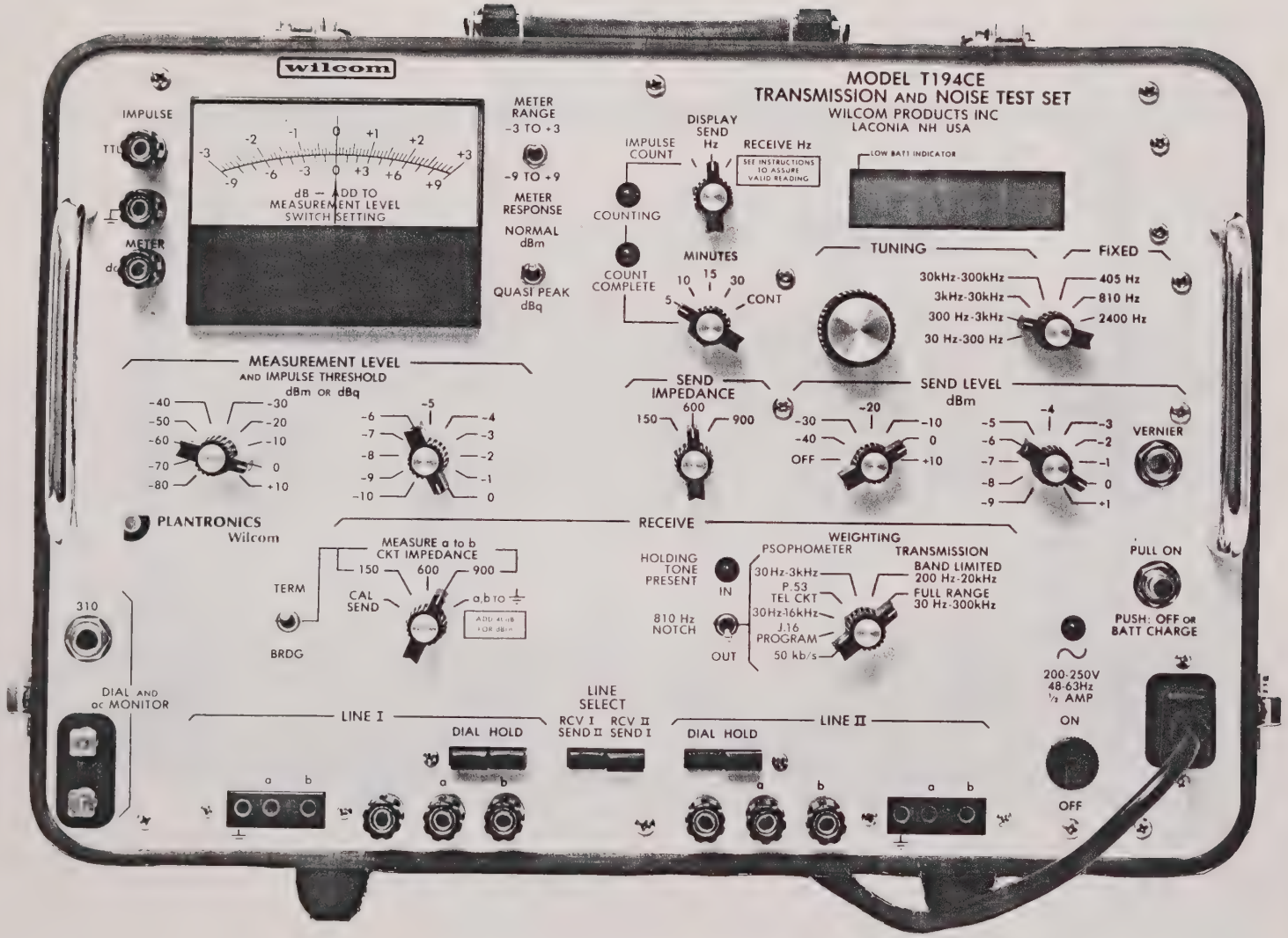


FIGURE 1-2

Model T194CE Transmission and Noise Test Set

2.0 SPECIFICATIONS

2.1 Receive Section

2.1.01 Measurement range of MEASUREMENT LEVEL Switches: (Add meter scale reading to setting of two MEASUREMENT LEVEL switches.)

Transmission Level: -90 to +10 dBm at zero on meter scale.

Noise Metallic (T194C ONLY): 0 to 100 dBrn at zero on meter scale.

Notched Noise: Minimum determined by tone level and notch depth. See 2.1.05.

Noise-to-Ground (T194C): 40 to 140 dBrn at zero on meter scale.

Noise a, b to GND (T194CE): -50 to +50 dBm at zero on meter scale.

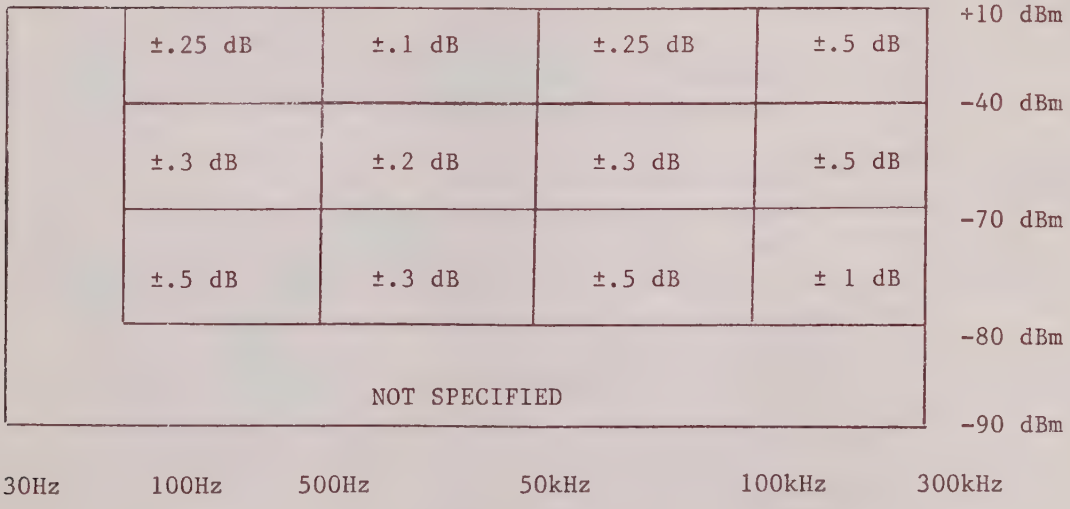
Impulse Count: see 2.1.08

Frequency Measurement: see 2.3.02

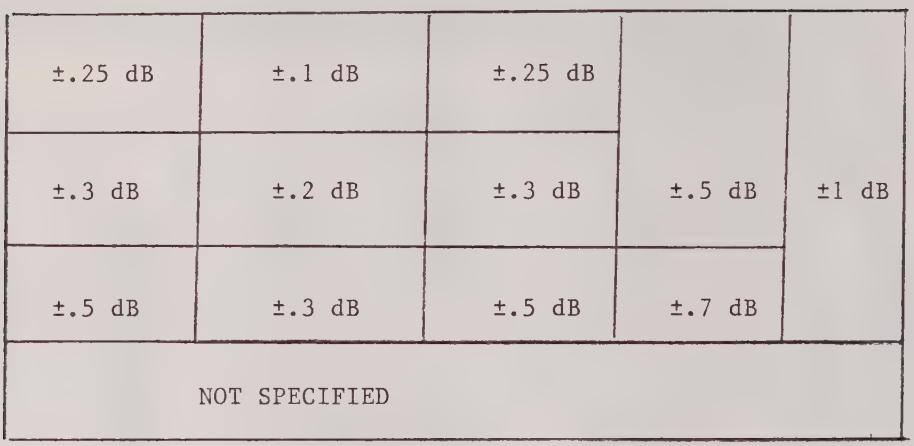
2.1.02 Accuracy:

Transmission Level measured at zero on meter scale, -3 to +3 METER RANGE, and flat FULL RANGE response (RECEIVE WEIGHTING):

T194C at 135 Ω Impedance, BRDG or TERM -
T194CE at 150 Ω Impedance, BRDG or TERM -



At 600 or 900 Ω Impedance, BRDG or TERM -



Accuracy, Noise Level:

At zero on meter scale: ±1.0 dB

T194C - Measured with 1000 Hz sine wave or wide band random noise
T194CE - Measured with 800 Hz sine wave or wide band random noise

2.1.03 Meter Scales:

-3 to +3: Zero center, 0.1 dB divisions
-9 to +9: Coarse scale with reduced accuracy, to facilitate setting MEASUREMENT LEVEL switches.

2.1.04 Meter Scale Accuracy:

-3 to +3 Range: ±3% of deflection (±0.09 dB at ends of scale).
-9 to +9 Range: ±5% of deflection (±0.45 dB at ends of scale).

NOTE: In either range, if net indication is outside range limits specified in 2.1.01, the accuracy is unspecified.

2.1.05 Weighting & Frequency Response:

Transmission Measurement:

Flat Full Range: Flat within accuracy specifications of 2.1.02

Band Limited
200 Hz - 20 kHz: Attenuation:
>25 dB at 60 Hz;
APPROX 3 dB at 200 Hz;
<.1 dB 400 Hz to 5 kHz;
APPROX 3 dB at 20 kHz;
20 dB per decade slope
at higher frequencies.

Noise Measurement:

T194C (NORTH AMERICAN)	T194CE (CCITT Psophometric)
3 kHz FLAT	30 Hz to 3 kHz
C MSG	P.53 TEL. CKT.
15 kHz FLAT	30 Hz to 16 kHz
Program	Programme
50 kb/s	50 kb/s
1010 Hz Notch	810 Hz Notch

Noise Measurement (T194C):

3 kHz FLAT (for unweighted measurement in program circuits):	2-pole Butterworth low-pass with 3 dB point at 3 kHz. See Fig. 1 for tolerances.
C-MSG:	See Fig. 2.
15 kHz FLAT (for unweighted measurement in program circuits):	2-pole Butterworth low-pass with 3 dB point at 15 kHz. See Fig. 3 for tolerances.
PROGRAM:	See Fig. 4
50 kb/s:	See Fig. 5
1010 Hz NOTCH (for noise-with-tone measurement in any noise weighting):	<.5 dB below 400 Hz and above 1700 Hz; <3 dB 400-862 Hz and 1182 1700 Hz; >50 dB 995-1025 Hz Holding Tone Level for Notch Filter: -40 to 0 dBm.

Noise Measurement (PSOPHOMETER) T194CE:

30 Hz to 3 kHz unweighted measurement in telephone circuits:	2-pole Butterworth low-pass with 3 dB point at 3 kHz. See Fig. 1 for tolerances.
TEL CKT:	CCITT REC P.53. See Fig. 6.

30 Hz to 16 kHz (unweighted measurement in program circuits):	CCITT REC J.16 (CCIR 468-1 ANNEX) See Fig. 7.
PROGRAM:	CCITT REC. J.16. (CCIR 468-1) See Fig. 8.
50 kb/s:	See Fig. 5.
810 Hz NOTCH (for noise-with-tone measurement in any noise weighting):	±.5 dB below 320 Hz and above 1360 Hz; down <3 dB 320-662 Hz and 982-1360 Hz; down >50 dB 798-822 Hz.

2.1.06 Detectors

Transmission Level Measurement:	Average absolute value
Noise Measurement:	True rms
Impulse Count:	Peak absolute value

2.1.07 Meter Response: (switch selectable)

Normal:	Linear, approx 250 ms time constant.
Damped (T194C):	Linear, approx one second time constant.
Quasi Peak (T194CE):	Non-linear time response per CCITT recommendation J.16 (CCIR rec. 468-1).

2.1.08 Impulse Counter:

Threshold:	Instantaneous peak power exceeding MEASUREMENT LEVEL switch setting.
Threshold Range(T194C):	30 to 100 dBrn metallic 60 to 140 dBrn noise to ground
Threshold Range(T194CE):	-60 to +10 dBm a to b -30 to +50 dBm a,b to Gnd.
Indicators:	COUNTING and COUNT COMPLETE If during noise-with-tone impulse count there is a loss of holding tone as indicated in 2.1.15, the COUNTING and COUNT COMPLETE indicators will start flashing and will continue to flash until timer is reset.
Dead Time:	125 ms ±5% (for max rate of 8/second)
Count Time:	5, 10, 15 and 30 minutes or continuous, switch selectable.
Display:	5-DIGITS (See 2.3)

2.1.09 Input Circuits & Impedances: (All balanced and dc blocked for 300 volts)

Impedance Switch Pos.	Term Impedance (nominal)	Bridging Impedance (Approx. at mid f.)	0 dBm Ref Level	0 dBrn Ref Level (T194C)
135 (T194C)	135	high	.367 V	11.5 μV
150 (T194CE)	150	high	.387 V	
600	600	high	.775 V	24.5 μV
900	900	high	.949 V	30.0 μV

NOTE: Bridging Impedance requirement is specified in terms of Bridging Loss.

T194C -

In N-G: 200 kΩ each side to ground: reference level for dBNG is 2.45 mV, and 40 dB to meter reading to obtain longitudinal noise level in dBrn relative to 24.5 μV (0 dBrn).

In N-G or CAL SEND, if TERM switch is on, 900 Ω termination is connected to RECEIVE line.

T194CE -

In a, b to GND: 200 kΩ each side to ground. Add 40 dB to obtain longitudinal noise level in dB relative to .775 V.

In a, b to GND or CAL SEND, if TERM switch is on, 900 Ω termination is connected to RECEIVE line.

Accuracy - Return Loss of Terminating Impedance with respect to nominal:

At 135 Ω setting (150 Ω setting):

Below 150 Hz:	Not specified
150 Hz to 600 Hz:	>15 dB
600 Hz to 20 kHz:	>30 dB
20 kHz to 300 kHz:	>15 dB

At 600 Ω or 900 Ω setting:

30 Hz to 150 Hz:	>15 dB
150 Hz to 5 kHz:	>30 dB
5 kHz to 50 kHz:	>15 dB
Above 50 kHz:	Not specified

2.1.10 Bridging Loss: (Drop in signal level when T194C (T194CE) bridging input is connected to test circuit having source and terminating impedances equal to selected RECEIVE IMPEDANCE).

30 Hz - 100 Hz:	<.3 dB
100 Hz to 100 kHz:	<.2 dB
100 kHz - 300 kHz:	<.5 dB

2.1.11 Longitudinal Balance of Input: (IEEE 455 for voice band with same method extended to full frequency); measure with input terminated (T194C).

>90 dB at 1 kHz, increasing at lower frequencies and decreasing at higher frequencies at a rate of 20 dB per decade.

Impedance Balance of Input: CCITT 0.121.A. (T194CE)

>90 dB at 1 kHz, increasing at lower frequencies and decreasing at higher frequencies at a rate of 20 dB per decade.

2.1.12 Effect of Longitudinal Voltage: The T194C (T194CE) will operate properly in the presence of an interfacing longitudinal voltage between the input terminals taken together and ground of 165 volts at 60 Hz or a voltage inversely proportional to frequency at higher frequencies. It will meet accuracy specifications in the presence of the above longitudinal interfering voltage provided the level being measured is not lower that -45 dBm.

2.1.13 Maximum Input Voltages (without damage):

Tip to Ring (a to b):	
dc:	300 V
ac:	15 V
Tip to Ring to GND (a,b to GND):	
dc to 100 Hz:	300 V
100 to 1 kHz:	Inversely proportional to frequency
Above 1 kHz:	30 V

2.1.14 Monitor Outputs

Impulse:	TTL Compatible, open collector, low indicates impulse.
Meter:	dc analog of meter deflection; ±3 V full scale open circuit; impedance 5 kΩ.
ac Monitor:	(At DIAL terminals and jack): Conditioned signal after weighting and level setting.

2.1.15 Receive Indicator:

Holding Tone:	When 1010 Hz NOTCH (810 Hz NOTCH) switch is on, the HOLDING TONE PRESENT lamp indicates presence of holding tone.

2.2 Send Section

2.2.01 Frequency Range:

Manual: 30 Hz to 300 kHz in 4 ranges as follows:

30 Hz to 300 Hz
300 Hz to 3 kHz
3 kHz to 30 kHz
30 kHz to 300 kHz

with approximately 10% overrange at each end of each range to assure overlap.

Fixed: Three fixed frequencies:

(T194C) 404 Hz
1010 Hz ALL ±0.5%
2800 Hz

(T194CE) 405 Hz
810 Hz ALL ±0.5%
2400 Hz

2.2.02 Tuning Controls:

Selector Switch: 7 position: 4 manual ranges and 3 fixed frequencies.

Manual: Dual ratio drive. Main drive covers full range in approximately 4 turns. Reverse vernier provides additional 6:1 reduction.

2.2.03 Tuning Stability:

With temperature: ±0.5%
(full operating range)

With line voltage: ±0.1%

With time: ±0.1%/day (no mechanical shock or vibration which could change the setting).

2.2.04 Level

Range: -49 dBm to +11 dBm and OFF

Controls: 7 Position Switch, 10 dB steps, -40 to +10 and OFF; 11 Position Switch, 1 dB steps, -9 to +1; Vernier, front panel accessible recessed screwdriver adj., ±1 dB continuous.

Setting: Use RECEIVE/CAL SEND switch setting. Measurement is at an internal point in send amplifier, independent of other control settings or external during CAL SEND measurement.

2.2.05 Level Accuracy (Measured with output terminated in its nominal impedance):

Switch Setting:	±0.1 dB
Stability (over operating conditions):	±0.05 dB

Flatness:

At 135 ohm (150 ohm):

Below 100 Hz:	Not specified
100 Hz to 200 Hz:	±0.25 dB
200 Hz to 50 kHz:	±0.1 dB
50 kHz to 150 kHz:	±0.25 dB
150 kHz to 300 kHz:	±0.5 dB

At 600 or 900 ohm:

30 Hz to 100 Hz:	±0.25 dB
100 Hz to 20 kHz:	±0.1 dB
20 kHz to 50 kHz:	±0.25 dB
50 kHz to 150 kHz:	±0.5 dB
150 kHz to 300 kHz:	±1.0 dB

CAL SEND Setting: at 1 kHz: ±0.1 dB
full frequency range: ±0.2 dB

2.2.06 Send Impedance:

Setting: Selectable 135 Ω (150 Ω), 600 Ω or 900 Ω

Accuracy: Return Loss with respect to nominal:

At 135 Ω (150 Ω) setting:

Below 150 Hz:	Not specified
150 Hz to 600 Hz:	>15 dB
600 Hz to 20 kHz:	>30 dB
20 kHz to 100 kHz:	>15 dB
Above 100 kHz:	Not specified

At 600 Ω or 900 Ω setting:

30 Hz to 150 Hz:	>15 dB
150 Hz to 5 kHz:	>30 dB
5 kHz to 50 kHz:	>15 dB
Above 50 kHz:	Not specified

2.2.07 LONGITUDINAL BALANCE - T194C - (Measure with SEND LEVEL set to OFF position):

(IEEE 455 for voice band with same method extended to full frequency.)

>80 dB at 4 kHz, increasing at lower frequencies and decreasing at higher frequencies at a rate of 20 dB per decade.

IMPEDANCE BALANCE - T194CE - (Measure with SEND LEVEL set to OFF position):

(CCITT 0.121.A)

>80 dB 4 kHz, increasing at lower frequencies and decreasing at higher frequencies at a rate of 20 dB per decade.

2.2.08 Signal Balance - T194CE - CCITT 0.121.C.A.:

30 Hz to 20 kHz:	>60 dB
20 kHz to 300 kHz:	>40 dB

2.2.09 Distortion and Noise:

Total Harmonics and Noise

30 Hz to 100 Hz	>55 dB below fundamental;
100 Hz to 10 kHz:	>65 dB below fundamental;
10 kHz to 300 kHz:	>55 dB below fundamental;

Except that noise level need not be below 0 dBrn (-90 dBm) with any noise weighting, or 10 dBrn (-80 dBm) over 300 kHz bandwith.

2.3 Digital Display Section

2.3.01 Functions:

3 Position Switch:	Send Frequency
	Receive Frequency
	Impulse Count

2.3.02 Frequency Measurement:

Four automatic ranges with overlap, arranged so that each range covers and extends beyond one generator tuning range:

Up to 399.99 Hz (.01 Hz resolution)
200.0 to 3999.9 Hz (0.1 Hz resolution)
2000 to 39999 Hz (1 Hz resolution)
20000 Hz up (10 Hz resolution)

Send Frequency: Measure generator frequency

Receive Frequency: Measures frequency of a received signal whose level is being measured, provided level indication is between -5 and +5 dB on meter scale and signal-to-noise ratio is at least 6dB.

Accuracy:	Range 1:	±0.02 Hz
	Range 2:	±0.2 Hz
	Range 3:	±2.0 Hz
	Range 4:	±20 Hz

2.3.03 Impulse Count Display:

Event-counter function, to 99999, reset to zero when DISPLAY FUNCTION switch is turned to SEND Hz and back to IMPULSE COUNT.

2.4 Dial, Hold and Line Select

2.4.01 Dual banana-plug binding post and 310 jack (balanced triple banana jack) connections are provided for two external lines, designated LINE I and LINE II.

2.4.02 Line Switching: Either line may be switch selected for connection to the measuring circuits input. The other line will be connected to the generator output.

2.4.03 Dial Provisions: A pair of clip-on terminals and 310 jack permit attaching lineman's telephone set for dialing a test number. Switches are provided for connecting either line to dial terminals and jack while disconnecting it from Receive or Send. If neither line is in DIAL, terminals and jack are connected to MONITOR.

2.4.04 Hold Circuit: A switchable electronic hold circuit is provided for each line:

Long Loop dc characteristic: 23 mA (±5%) when 46 volt source (minimum office battery) is applied through 1700 Ω external resistance (representing 450 Ω max battery feed resistance plus 1250 Ω max loop resistance).

Short Loop dc characteristic: Current limited to 35 mA max.

Small signal ac characteristic: Approximately 100 H simulated inductance shunted by 100 kΩ resistance. Negligible bridging loss over full measurement frequency range.

Large signal ac characteristic: At 23 mA dc, max signal voltage without clipping is approximately 4.5 volts peak. (+10.5 dBm, 900 Ω SEND level, assuming matched termination). Signal limited increases for shorter loops.

NOTE: The electronic hold circuit is designed for use with 48 volt and 24 volt circuits. It requires a minimum of six to eight volts tip-to-ring (a to b).

2.5 Operating Power

2.5.01 Internal Batteries:

Rechargeable (internal battery charge circuits); nickel-cadmium
Charge Time: Approximately 6 hours
Operating Time (after full charge): Approximately 6 hours
Low Battery Indication: Arrow on digital display

2.5.02 Line Operation:

100 to 135 V (200 to 250 V also available), 48 to 62 Hz, approximately 1/2 amp.

NOTE: The electronic hold circuit is designed for use with 48 volt and 24 volt circuits. Because it required a minimum of six to eight volts tip-to-ring, it will not operate satisfactorily with six volt battery circuits, such as AML carrier terminal units.

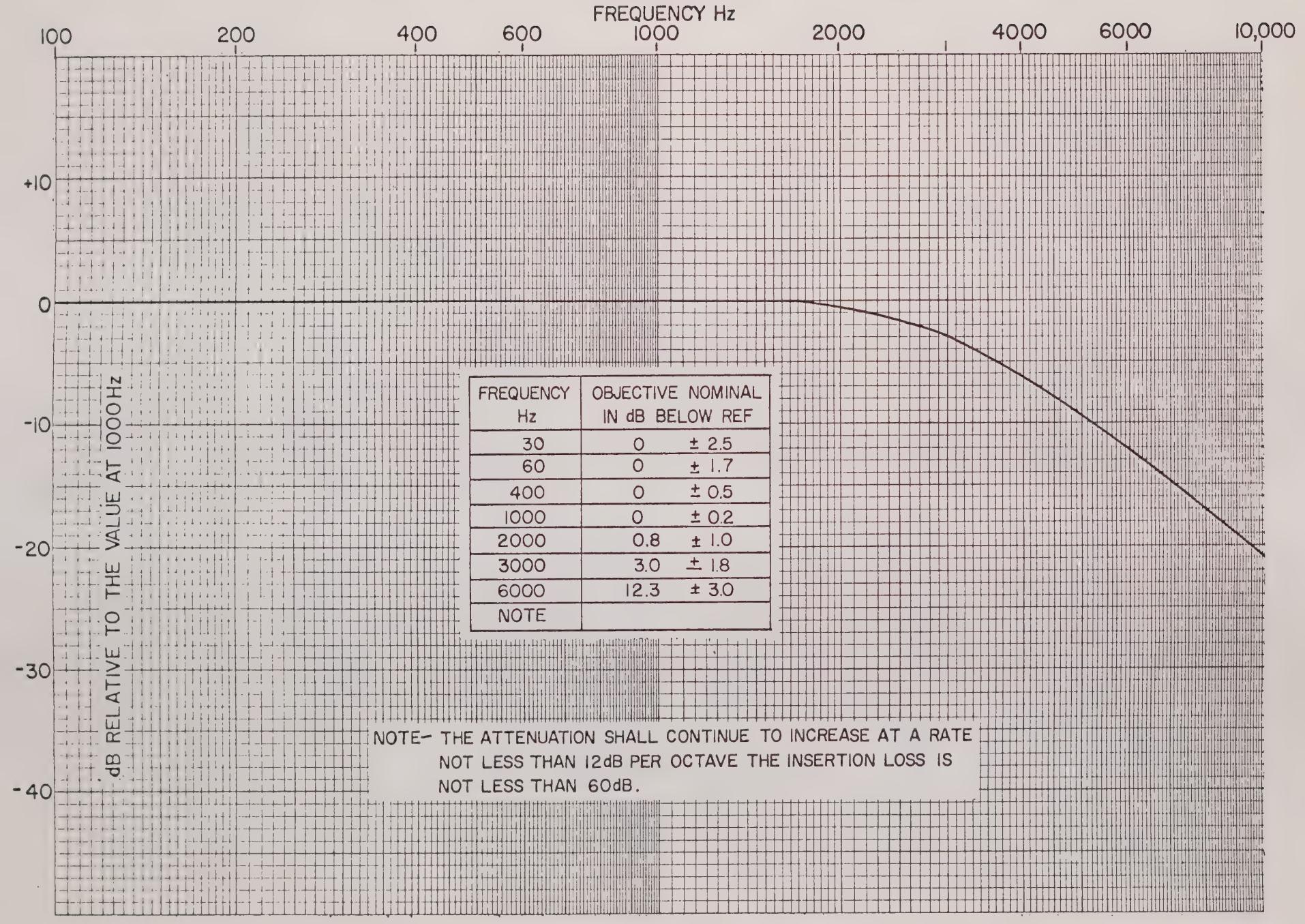
2.6 Miscellaneous

2.6.01 Environmental

Operating Temperature:	0 to 50°C
Humidity:	95% at 35°C
	40% at 50°C
Storage Temperature:	-55°C to +70°C
Altitude: (non-operating):	15,000 m.

2.6.02 Physical

Size:	390 mm Wide x 260 mm High x 280 mm Deep
Mass:	Approx 12 kg

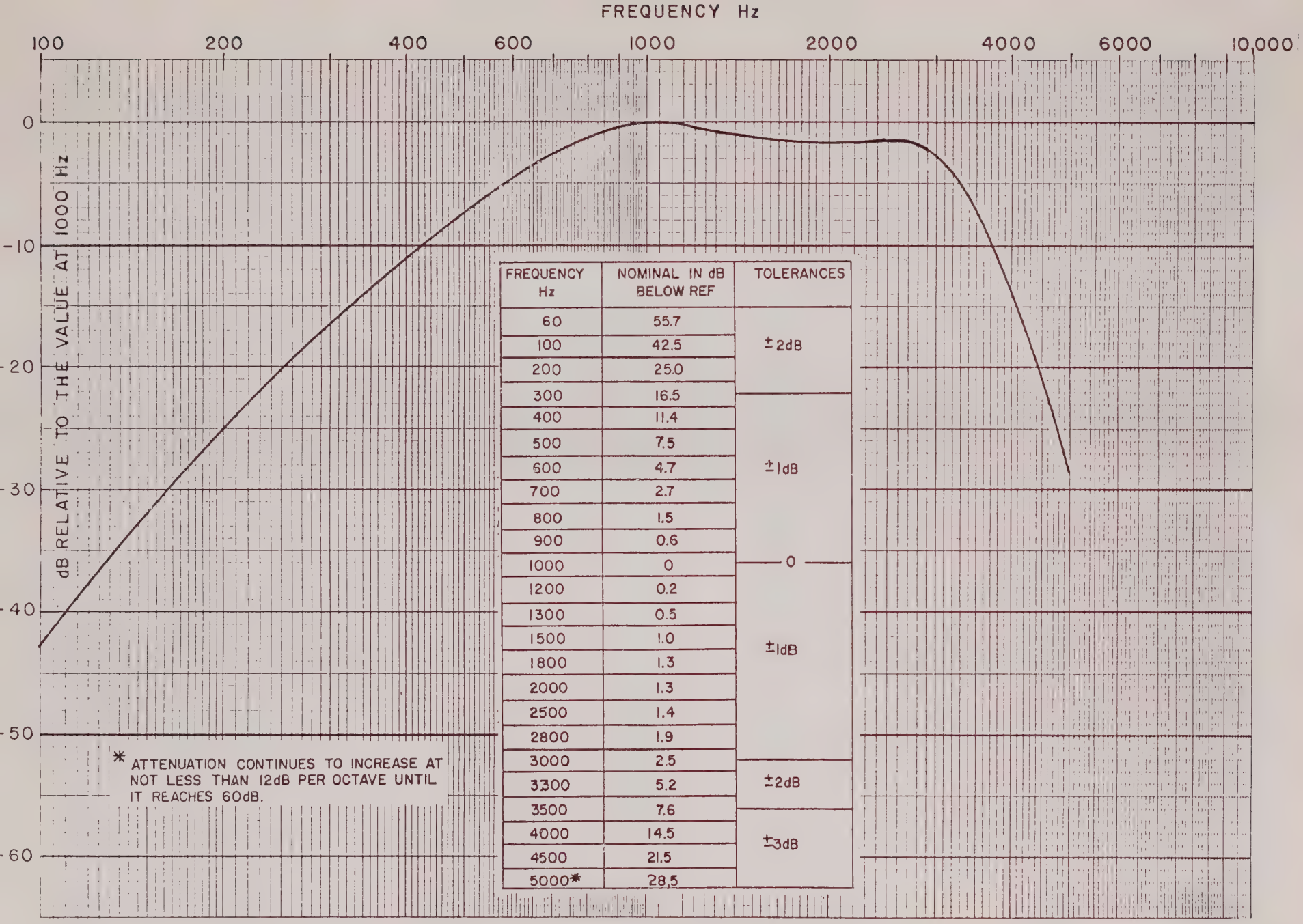


FREQUENCY Hz	OBJECTIVE NOMINAL IN dB BELOW REF
30	0 ± 2.5
60	0 ± 1.7
400	0 ± 0.5
1000	0 ± 0.2
2000	0.8 ± 1.0
3000	3.0 ± 1.8
6000	12.3 ± 3.0
NOTE	

NOTE- THE ATTENUATION SHALL CONTINUE TO INCREASE AT A RATE NOT LESS THAN 12dB PER OCTAVE THE INSERTION LOSS IS NOT LESS THAN 60dB.

3kHz FLAT WEIGHTING CHARACTERISTIC

FIG.1

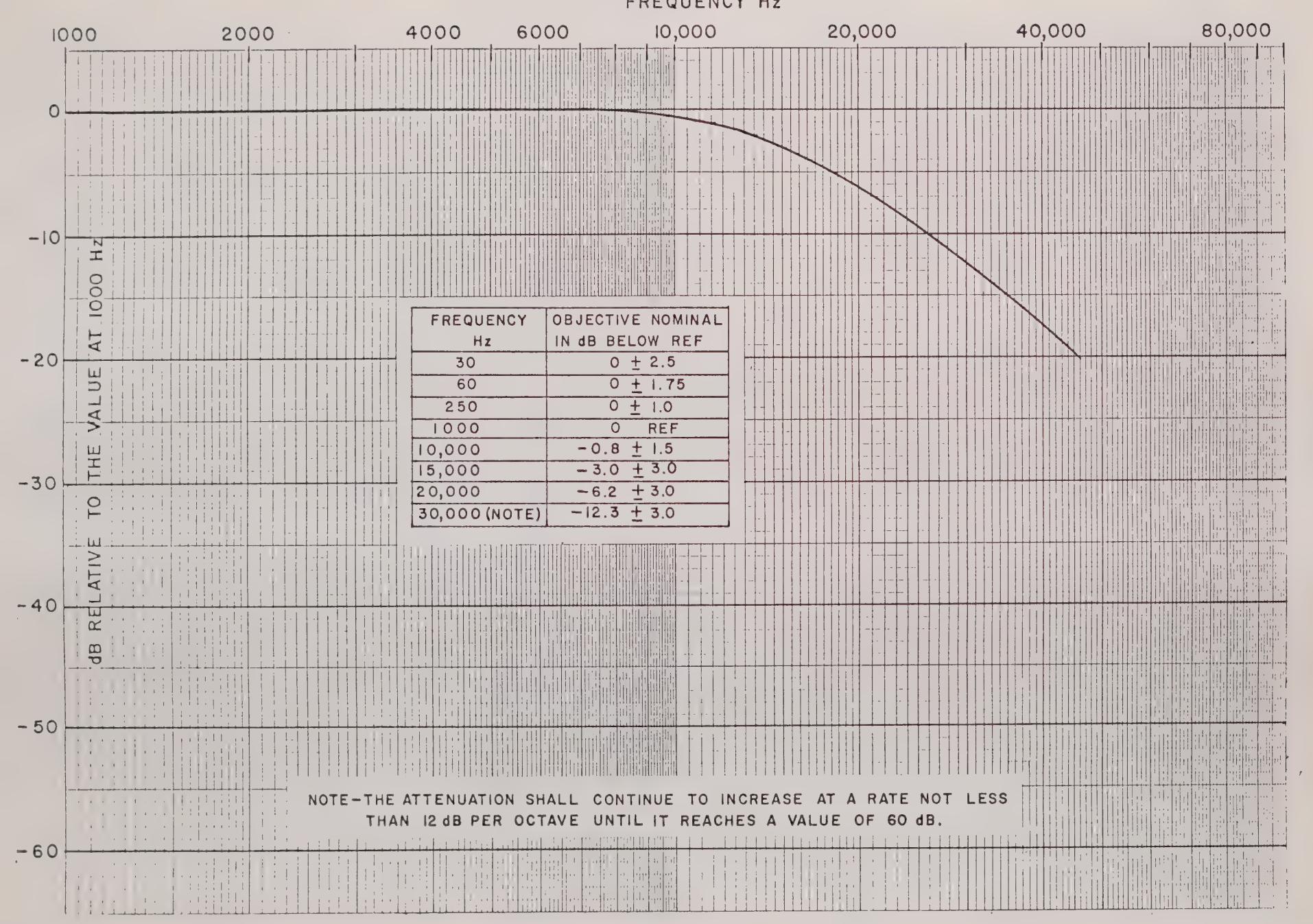


FREQUENCY Hz	NOMINAL IN dB BELOW REF	TOLERANCES
60	55.7	±2dB
100	42.5	
200	25.0	
300	16.5	±1dB
400	11.4	
500	7.5	
600	4.7	
700	2.7	
800	1.5	
900	0.6	
1000	0	0
1200	0.2	±1dB
1300	0.5	
1500	1.0	
1800	1.3	
2000	1.3	
2500	1.4	
2800	1.9	
3000	2.5	±2dB
3300	5.2	
3500	7.6	±3dB
4000	14.5	
4500	21.5	
5000*	28.5	

* ATTENUATION CONTINUES TO INCREASE AT NOT LESS THAN 12dB PER OCTAVE UNTIL IT REACHES 60dB.

C MESSAGE WEIGHTING CHARACTERISTIC

FIG. 2

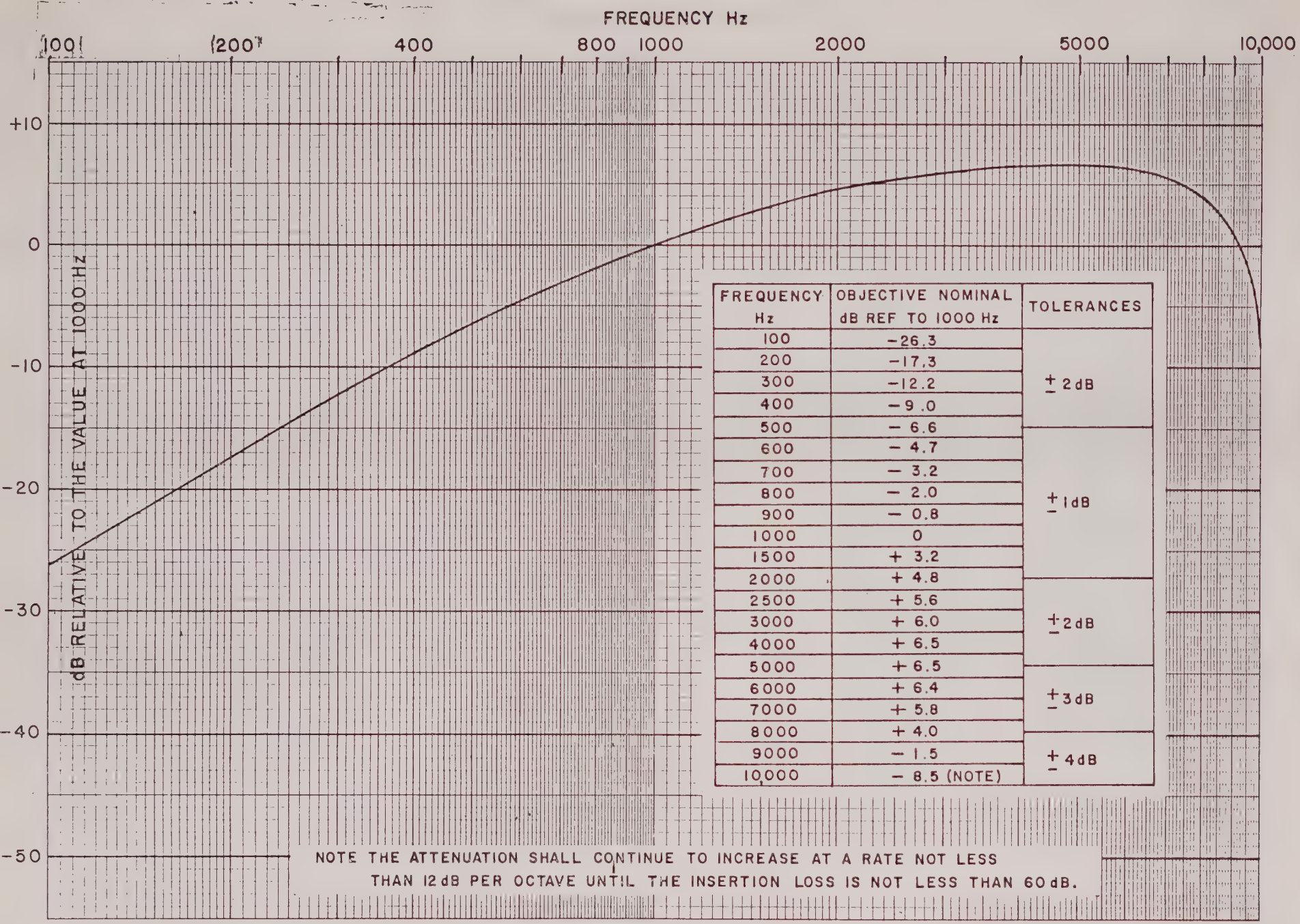


FREQUENCY Hz	OBJECTIVE NOMINAL IN dB BELOW REF
30	0 ± 2.5
60	0 ± 1.75
250	0 ± 1.0
1000	0 REF
10,000	−0.8 ± 1.5
15,000	−3.0 ± 3.0
20,000	−6.2 ± 3.0
30,000 (NOTE)	−12.3 ± 3.0

NOTE—THE ATTENUATION SHALL CONTINUE TO INCREASE AT A RATE NOT LESS THAN 12 dB PER OCTAVE UNTIL IT REACHES A VALUE OF 60 dB.

15kHz FLAT WEIGHTING CHARACTERISTIC

FIG. 3

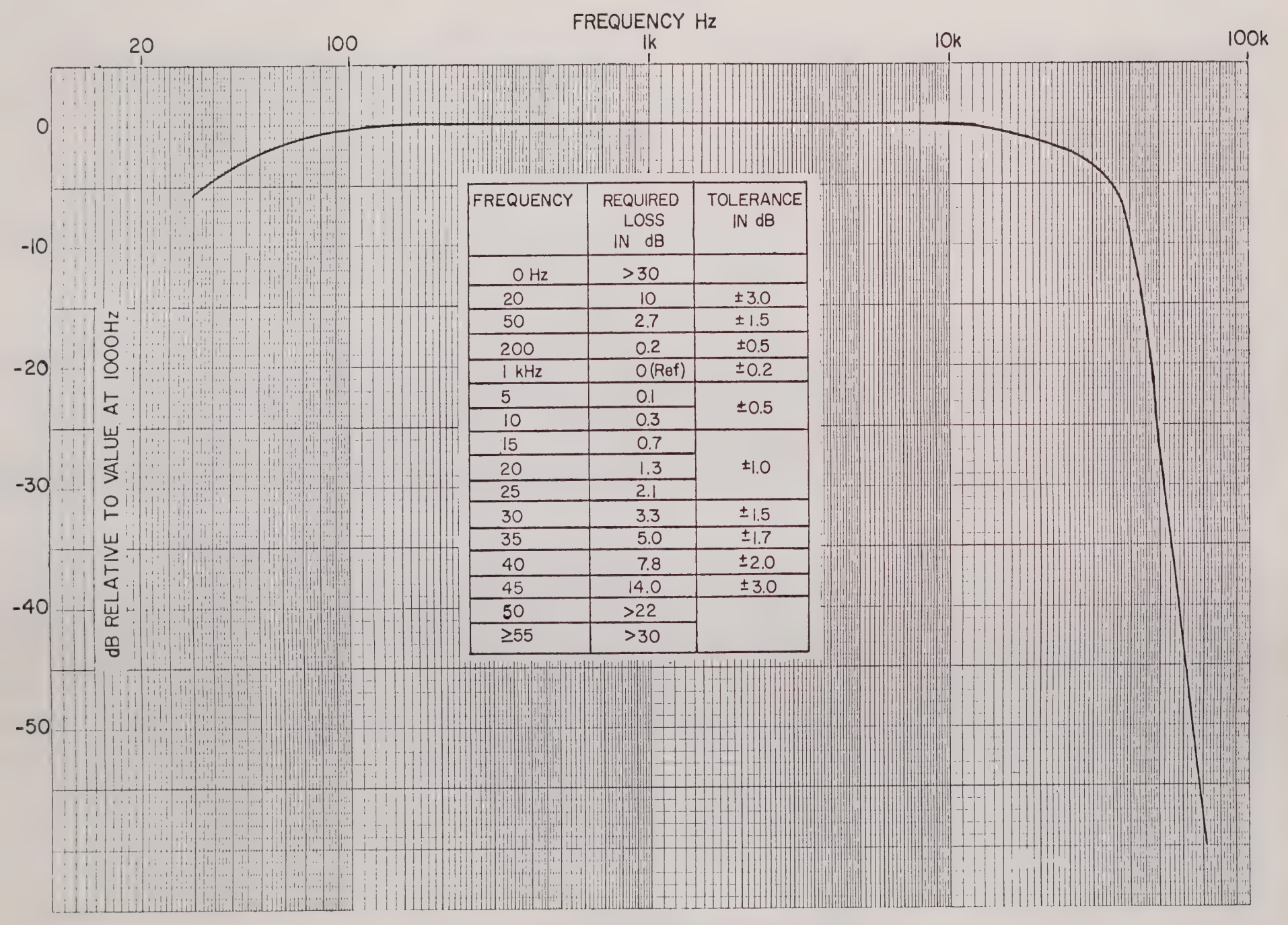


FREQUENCY Hz	OBJECTIVE NOMINAL dB REF TO 1000 Hz	TOLERANCES
100	−26.3	± 2 dB
200	−17.3	
300	−12.2	
400	− 9.0	
500	− 6.6	± 1 dB
600	− 4.7	
700	− 3.2	
800	− 2.0	
900	− 0.8	
1000	0	
1500	+ 3.2	
2000	+ 4.8	± 2 dB
2500	+ 5.6	
3000	+ 6.0	
4000	+ 6.5	
5000	+ 6.5	± 3 dB
6000	+ 6.4	
7000	+ 5.8	
8000	+ 4.0	± 4 dB
9000	− 1.5	
10,000	− 8.5 (NOTE)	

NOTE THE ATTENUATION SHALL CONTINUE TO INCREASE AT A RATE NOT LESS THAN 12 dB PER OCTAVE UNTIL THE INSERTION LOSS IS NOT LESS THAN 60 dB.

PROGRAM WEIGHTING CHARACTERISTIC

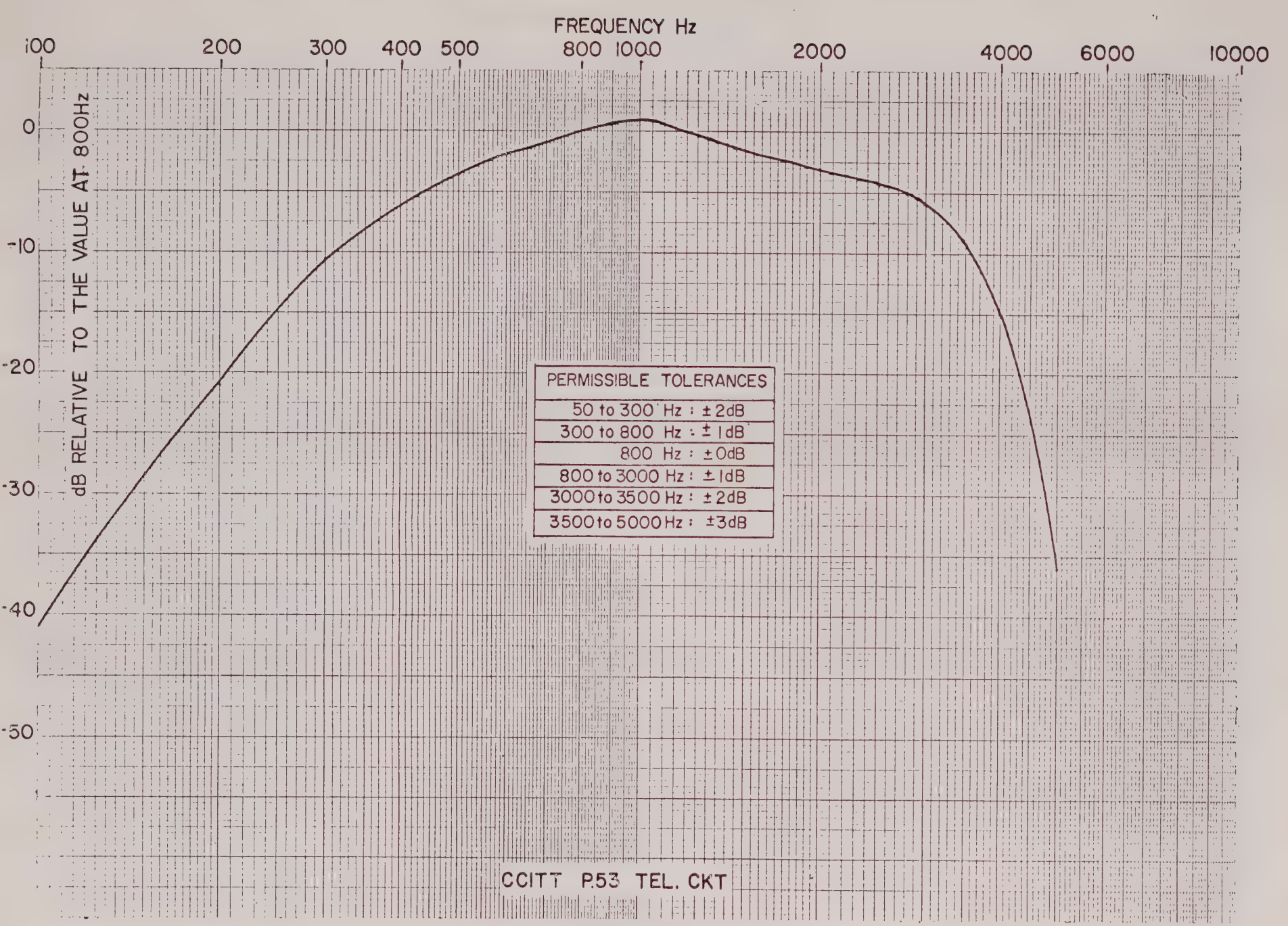
FIG. 4



FREQUENCY	REQUIRED LOSS IN dB	TOLERANCE IN dB
0 Hz	>30	
20	10	±3.0
50	2.7	±1.5
200	0.2	±0.5
1 kHz	0 (Ref)	±0.2
5	0.1	±0.5
10	0.3	
15	0.7	±1.0
20	1.3	
25	2.1	
30	3.3	±1.5
35	5.0	±1.7
40	7.8	±2.0
45	14.0	±3.0
50	>22	
≥55	>30	

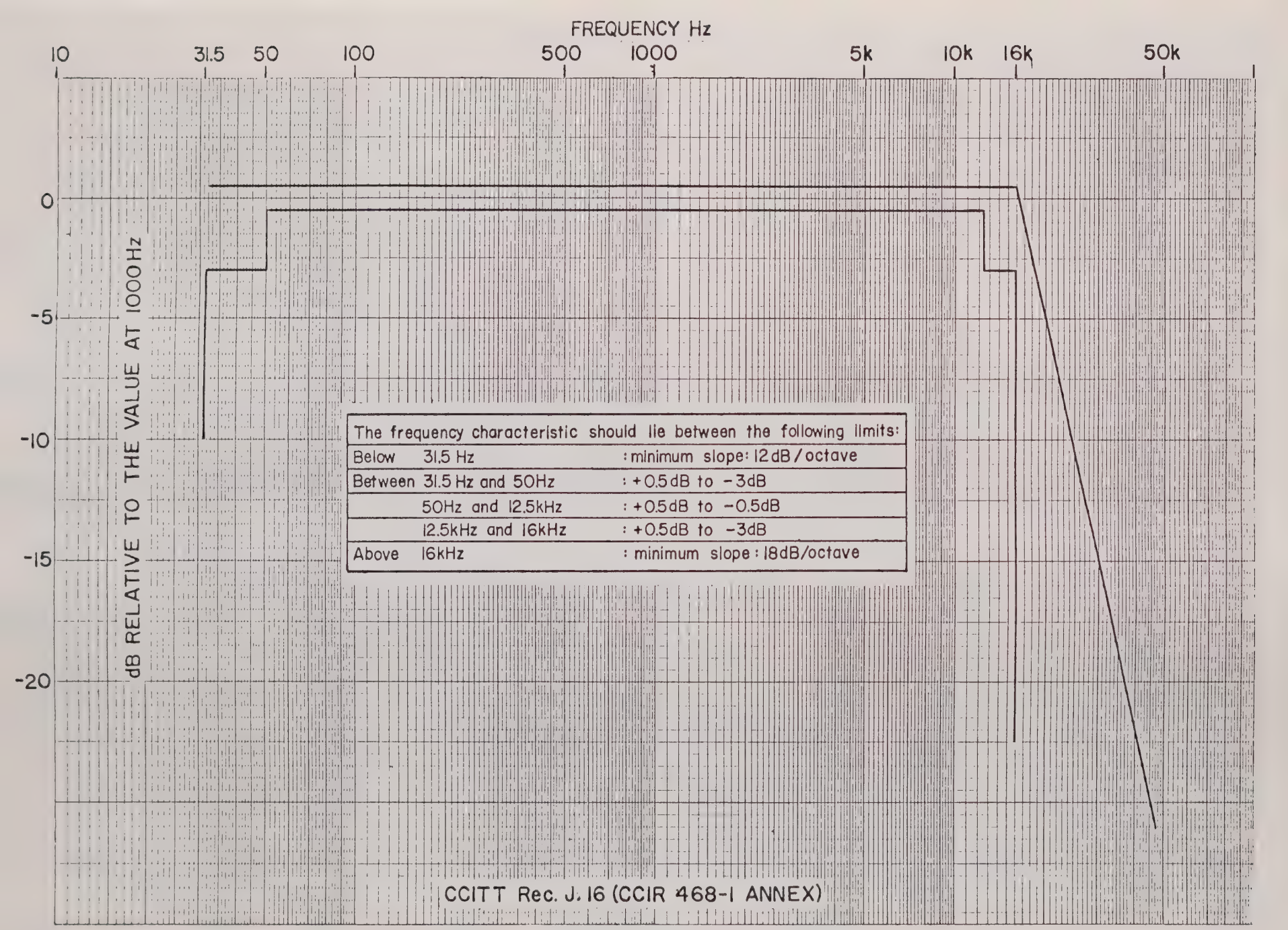
50kb/S WEIGHTING CHARACTERISTIC

FIG. 5



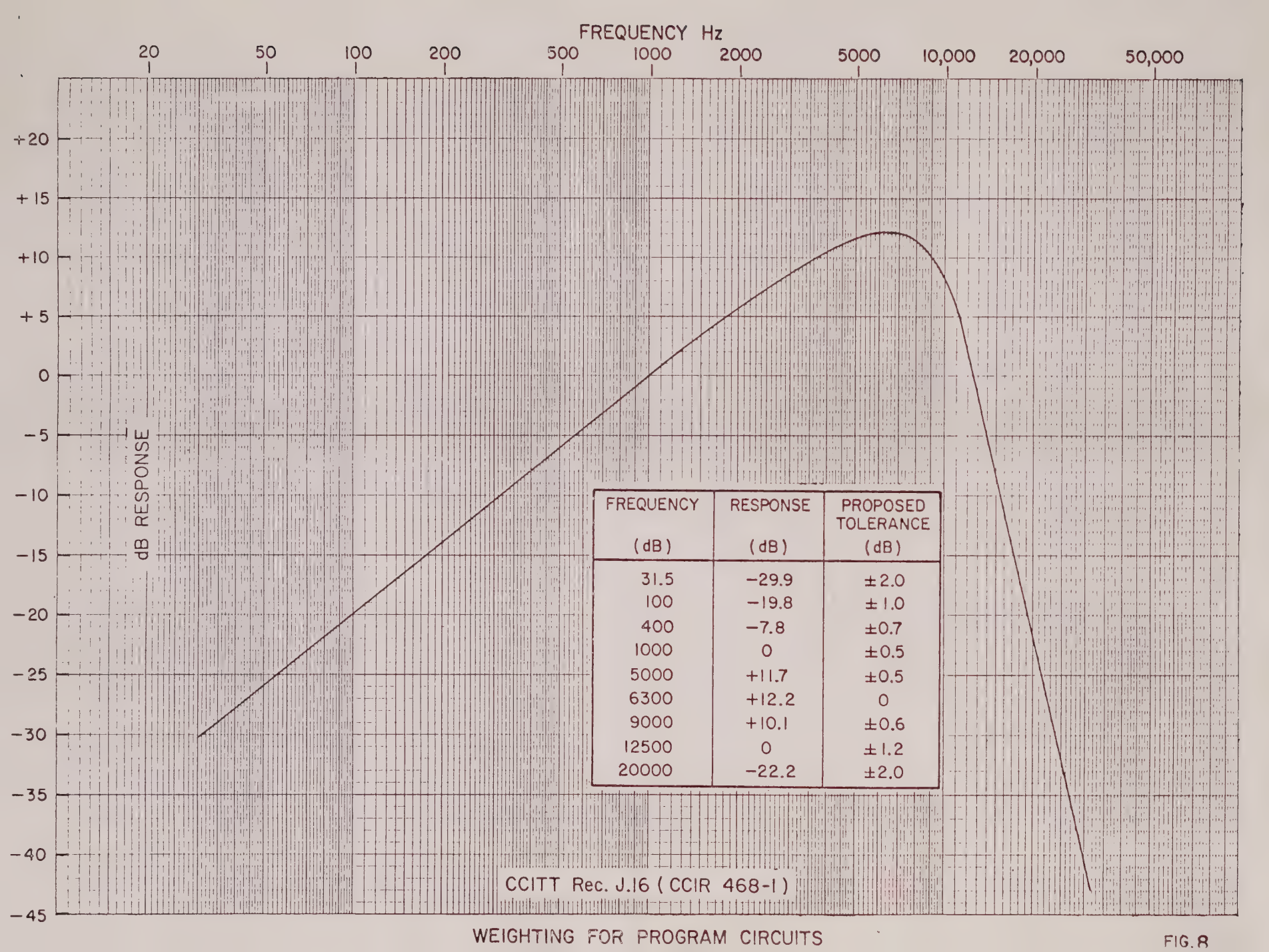
PSOPHOMETER WEIGHTING

FIG. 6



UNWEIGHTED FOR PROGRAM CIRCUITS

FIG. 7



WEIGHTING FOR PROGRAM CIRCUITS

FIG. 8

3.0 PANEL CONTROLS AND CONNECTIONS

3.1 General

3.1.01 This section describes the function of each switch, control, lamp and connector of the Model T194C (T194CE) Transmission and Noise Test Set.

3.1.02 The section is subdivided into sections relating to:

Power
Input/Output
Display
Meter
Impulse Noise
Send
Receive

3.1.03 Figure 3-1a (3-1b) locates the connections, controls and control switches listed by the subdivisions of the section.

3.1.04 Push button action definitions -

(1) Push-push: The switch remains engaged when pressed and must be pressed again to release. The switch function continues as long as the switch remains engaged.

(2) Interlocking: Consists of a group of two or more switches. When any switch in a group is pressed, it automatically releases any other switch that was engaged. The switch function continues until released by pressing another switch in that group.

3.2 Power Related Controls and Connections

3.2.01 ac Power Receptacle - This is a 3-prong male plug recessed in the lower right hand corner of the front panel of the test set. The line cord supplied with the set applies ac power to the set through this connection.

3.2.02 Fuse - A twist-lock fuse holder is located on the power supply tray inside of the cover. Refer to Section 6.5.01 before removing the cover. A one ampere fuse protects the test set.

3.2.03 ac ON/OFF - This two position toggle switch controls the application of ac power to the test set. When the switch is in the ON position, and LED is illuminated to indicate ac power is being applied to the set.

3.2.04 dc PULL:ON/PUSH:OFF or BATT CHARGE - This push-pull action switch controls application of dc power to the internal circuits. When the switch is in the ON position dc voltage will be obtained from the internal batteries. With both dc and ac power switches on, the batteries are being trickle charged while the set is in operation. With only the ac power switch on, the batteries are being fast charged. Charge time is overnight for full charge after LOW BATT light comes on.

3.2.05 Low Battery: The LOW BATT "LED" comes on when the batteries need charging (about 1/4 full charge). Continued use results in shutdown of the dc voltage supply circuits.

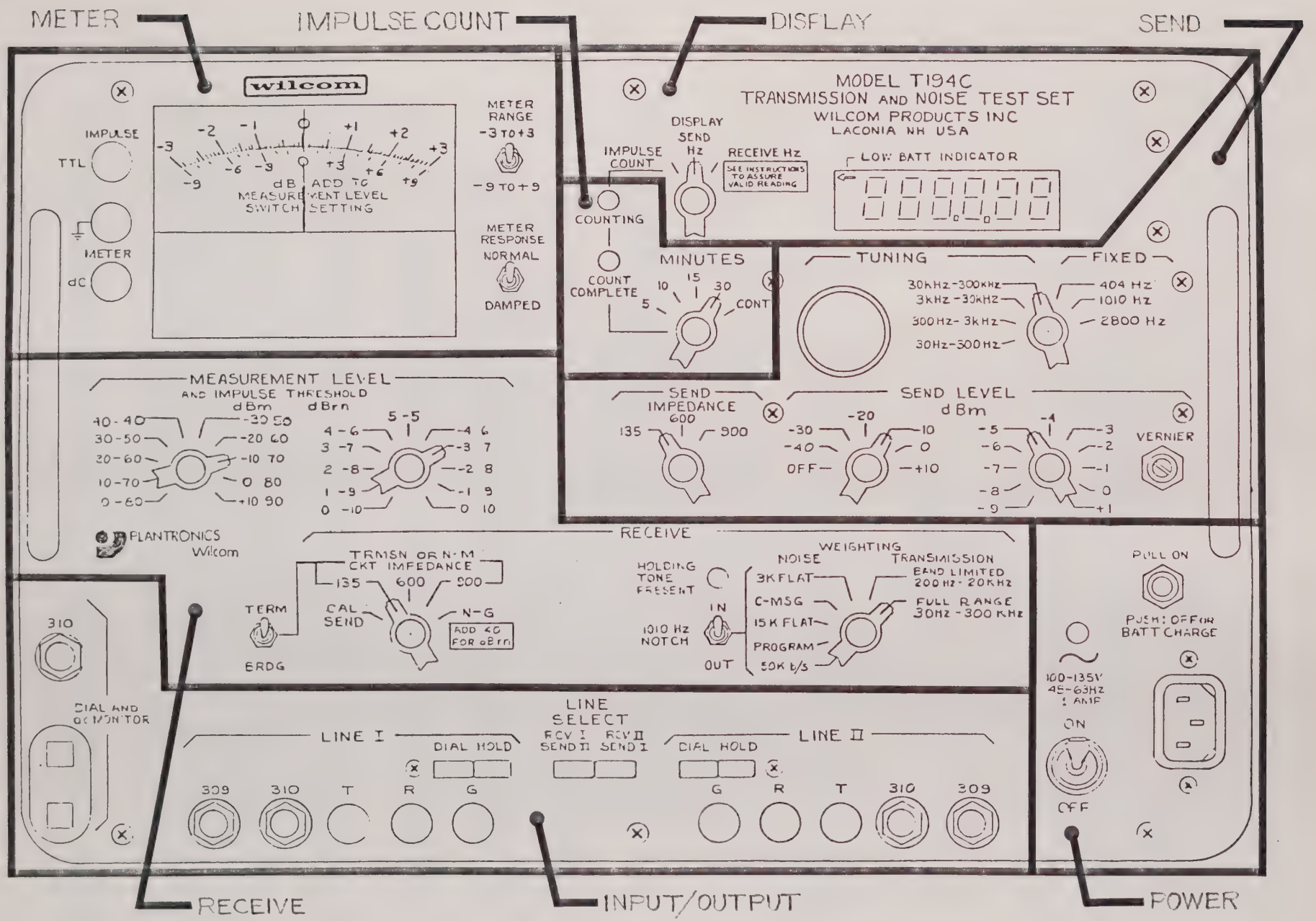


FIGURE 3-1a
PANEL CONTROLS & CONNECTIONS

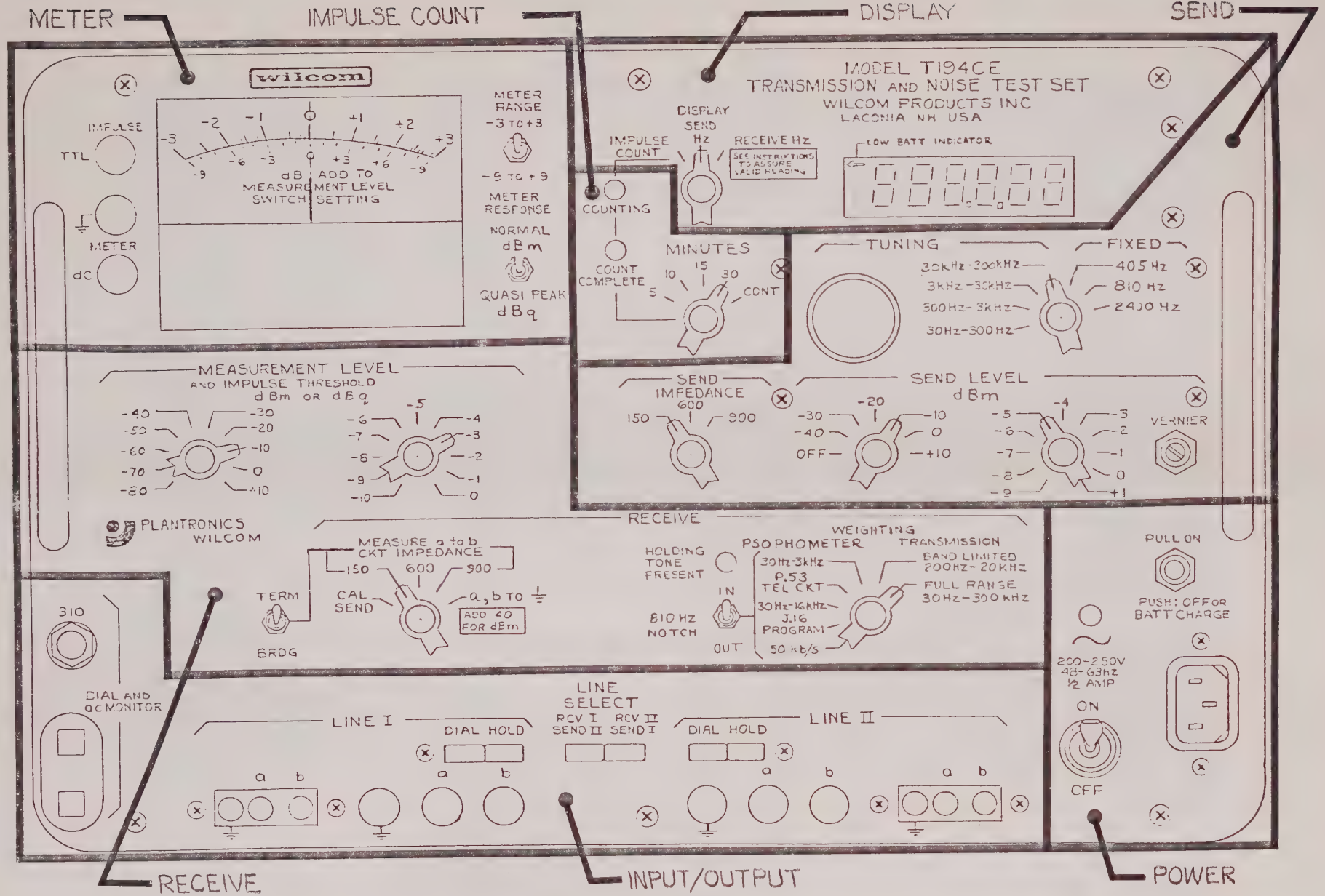


FIGURE 3-1b
PANEL CONTROLS & CONNECTIONS

3.3 Common Controls and Connections - See figure 3-1a (3-1b) panel divisions labeled INPUT/OUTPUT, DISPLAY and METER.

3.3.01 LINE I, LINE II - Two lines may be connected to the T194C (T194CE) by several methods. The lines designated LINE I and LINE II are located along the bottom edge of the test set. Connections may be made to the balanced signal 310 jacks or to the multi-purpose binding posts labeled T,R and G (a,b and GND).

3.3.02 LINE SELECT - RCV I/SEND II, RCV II/SEND I - These push button switches, located between lines I and II, connect the two lines under test to the send or to the receive section. The push buttons are interlocking.

3.3.03 DIAL and ac MONITOR - Two square metal posts and a 310 jack are located in the lower left corner of the front panel. The dial posts and jack allow connection of a lineman's telephone test set for dialing purposes on line I or line II when the respective DIAL push button is pressed. When both DIAL push buttons are released, the ac MONITOR function is operative.

3.3.04 LINE I, LINE II - DIAL/HOLD - These push buttons perform the dial function referred to above. The HOLD push button for either line is used to hold a dialed-up connection. Section 3.1.04 describes the push button action.

3.3.05 DISPLAY Switch - This three-position switch, located at top center of the panel, connects the Digital Display to the RECEIVE Hz, SEND Hz and to the IMPULSE COUNT. (The "SEE INSTRUCTIONS" note, beneath the RECEIVE Hz switch position, is detailed in Section 4.4.06).

3.3.06 Digital Display - The autoranging six digit liquid crystal display shows receive frequency, send frequency and impulse count. It also serves as a low battery indicator when the arrow in the upper left corner of the display is illuminated.

3.3.07 Decibel Meter - The dB meter interpolates measurement levels to 0.1 dB on the -3 +3 range. A coarse scale -9 to +9 facilitates setting the MEASUREMENT LEVEL switches. These dB meter ranges are switch selectable on the upper right side of the meter.

3.3.08 METER RESPONSE - Two switch positions:

NORMAL - Power measurement with normal meter damping.

DAMPED (QUASI PEAK) - Power measurement with meter damped to facilitate making measurement under severly fluctuating noise conditions.

3.3.09 Binding posts METER/dc and IMPULSE/TTL are located to the left of the decibel meter. The "METER/dc" output provides an analog of the meter deflection for recorder use; zero output at zero dB meter scale reading and three volts into high impedance for full scale meter deflection (plus or minus). The IMPULSE/TTL jack provides a TTL compatible pulse to external circuits for each impulse count.

3.4 Controls Related to Impulse Noise Measurements

3.4.01 DISPLAY/IMPULSE COUNT - This switch position allows selection of the counting interval; it is used in conjunction with the MINUTES switch. Located between the IMPULSE COUNT and MINUTES switch are two LED's designated COUNTING and COUNT COMPLETE. They remain illuminated while performing their respective count functions. When the DISPLAY switch is first switched to IMPULSE COUNT, it resets both the impulse counter and the display counter. To initiate a new counting interval, turn the switch to one of the other positions and back to IMPULSE COUNT.

3.4.02 MINUTES Switch - With this switch, counting intervals of 5, 10, 15, 30 minutes and continuous count (CONT) can be selected.

3.5 Controls Related to Sending Tones

3.5.01 DISPLAY/SEND Hz - This switch in the DISPLAY/SEND Hz position actuates the send controls and the appropriate common connections.

3.5.02 TUNING - These controls, located below the digital display, provide manual tuning control from 30 Hz to 300 kHz in four decade ranges. Each range selected may be tuned by approximately four revolutions of the dual ratio tuning control. Vernier control is provided by reverse tuning. (The display is autoranging). The send signal may be monitored by switching the RECEIVE TRMSN or N-M CKT IMPEDANCE switch (RECEIVE MEASURE a to b CKT IMPEDANCE switch) to the CAL SEND position. See section 3.6.04.

3.5.03 FIXED tuning - In addition to four decade tuning ranges, three fixed frequencies are provided: 404 Hz, 1010 Hz and 2800 Hz (405 Hz, 810 Hz and 2400 Hz).

3.5.04 SEND LEVEL dBm - There are two step attenuators and a level VERNIER control to set the output level. A 10 dB step attenuator is calibrated from +10 to -40 dBm; the one dB attenuator is calibrated from 0 to -9 dBm. The VERNIER has a range of ±1 dB for precisely calibrating the output level. The OFF position removes the generator signal from the output terminals and terminates the SEND output terminals.

3.5.05 SEND IMPEDANCE Switch - One of three send impedances may be selected - 135, 600 or 900 ohms (150, 600 or 900 ohms).

3.6 Controls Related to Receiving Tones

3.6.01 DISPLAY/RECEIVE Hz - This switch in the DISPLAY/REC Hz position actuates the receive controls and the appropriate common connections.

3.6.02 RECEIVE, WEIGHTING - This switch, located above the LINE II connections determines the response characteristics of the receive portion of the T194C (T194CE). It also selects either the average-responding detector in the two TRANSMISSION positions or the quasi-rms detector in the five NOISE position.

3.6.03 1010 Hz NOTCH (810 Hz NOTCH) - This switch, located next to the WEIGHTING/NOISE (PSOPHOMETER) controls the operation of a tuned rejection filter. It is used to reject holding tones in the range of 995 or 1025 Hz (798-822 Hz) which are applied to some transmission systems during measurements. An LED when illuminated indicates the presence of a holding tone.

3.6.04 TRMSM or N-M CKT IMPEDANCE - The receive section input impedance and corresponding voltage reference level are selected by this switch. Impedance of 135 (150), 600 or 900 ohms or noise to ground (N-G) (a,b, to GND) may be selected. The N-G (a,b, to GND) position has an impedance of 100 kilograms on each side of the line to ground. A toggle switch (BRDG/TERM) to the left of the five position switch provides for a bridged or a terminated measurement. Included in the five position switch is a CAL SEND position that connects the measuring circuit input to the output of the send amplifier prior to the impedance selection circuits. The send signal level may then be monitored without affecting the output level or impedance.

3.6.05 MEASUREMENT LEVEL AND IMPULSE THRESHOLD switching - There are two level switches in the RECEIVE section of the test set. The T194C has a 10 dB step attenuator calibrated +10 dBm to -80 dBm and 0 dBrn to 90 dBrn. To the right is a one dB step attenuator calibrated 0 dBm to -10 dBm and 0 dBrn to 10 dBrn. The T194CE is the same except the dBrn scales are omitted.

4.0 OPERATING INSTRUCTIONS

4.1 Power

4.1.01 The T194C (T194CE) TRANSMISSION and NOISE TEST SET is powered by either 110 volts ac (230 Vac) or by two nickel-cadmium batteries that utilize internal battery charge circuits.

4.1.02 After a line cord has been attached (Section 3.2.01) ac power is supplied to the set by placing the ON/OFF toggle switch to ON. The application of ac power illuminates an LED. The PULL:ON/PUSH:OFF switch, when pulled, applies dc power to the internal circuits. The dc ON condition is indicated by the fact that the digital displays are on.

4.1.03 When ac power is not available or the ac toggle switch is OFF, the PULL:ON/PUSH:OFF switch provides dc power from the internal batteries.

NOTE: Battery operation requires a ground terminal connected to a good earth ground when reading noise to ground (N-G).

4.1.04 The condition of the batteries may be determined by observing the LOW BATT INDICATOR arrow on the digital display when the batteries are discharged to about 1/4 full charge. Continued use results in shutdown of the dc voltage supply circuits.

4.2 Dial and Hold

4.2.01 To dial and hold a line:

a. Connect the line to the desired line terminals on the Test Set, LINE I or LINE II.
b. Push the DIAL push button for the associated line terminals.
c. Connect a lineman's test telephone to the dial posts or 310 jack, DIAL and ac MONITOR, and dial the required test number.
d. After reaching the test number, push the HOLD push button for the associated line terminals. Push to release the DIAL push button.
e. The connection will now be held until released by pushing to release the HOLD push button.

4.2.02 If both DIAL buttons are pressed, only LINE I will be connected to the DIAL AND MONITOR jack and terminals. If neither DIAL button is pressed, the DIAL AND MONITOR jack and terminals are connected to a circuit which permits listening to the signal being measured. (If neither switch is operated, both lines will be connected to the send circuits).

4.3 Sending Tones - Setting and Calibration

4.3.01 Set the RECEIVE, TRMSN or N-M switch to the CAL SEND position. In the CAL SEND switch position, measurement is made at an internal point in the send amplifier that is independent of other control settings or external connections. In other words, the signal is not interrupted during the CAL SEND measurement.

4.3.02 The 1010 Hz NOTCH (810 Hz NOTCH) AND WEIGHTING circuits as well as the SEND IMPEDANCE CIRCUITS are bypassed when the RECEIVE MEASURE switch is in the CAL SEND position.

4.3.03 With the output of the send amplifier connected to the measuring circuits, the output signal level can be adjusted for the level required for the nominal circuit impedance of the line selected by the LINE SELECT push buttons.

4.3.04 Set both the MEASUREMENT LEVEL and the SEND LEVEL attenuators to the required send level.

4.3.05 Set the DISPLAY switch to the SEND Hz position.

4.3.06 Using the TUNING dial and switch, select the range of frequencies that includes the desired send frequency.

4.3.07 The send frequency selected by the tuning dial will appear in the digital display.

4.3.08 Calibrate the output meter by adjusting the SEND LEVEL VERNIER for zero dB on the meter scale.

4.3.09 Press a LINE SELECT push button, RCV I/SEND II or RCV II/SEND I to send the tone where required.

4.4 Measuring Received Tones - Level and Frequency

4.4.01 The Model T194C (T194CE) Transmission and Noise Test Set will measure the level and frequency of a tone in the frequency range of 30 Hz to 300 kHz at levels between +10 dBm and -90 dBm at zero on the dB meter. (dB meter scale reading can be added to switch setting - see section 2.1.04).

4.4.02 Set the LINE SELECT switch to the required external circuit - RCV I/SEND II or RCV II/SEND I.

4.4.03 Set the WEIGHTING switch to one of the TRANSMISSION weighting networks - BAND LIMITED 200 Hz - 20 kHz or FULL RANGE 30 Hz - 300 kHz.

4.4.04 Set the RECEIVE - BRIDGE/TERM switch to the required position.

4.4.05 Set the RECEIVE - TRMSN or N-M CKT IMPEDANCE switch (MEASURE a to b CKT IMPEDANCE switch) to the nominal impedance of the line or device being measured - 135 (150), 600 or 900 ohm.

4.4.06 Adjust the dB scale of the MEASUREMENT LEVEL attenuators for a dB meter reading near zero on the meter scale. The received level will be the algebraic sum of the MEASUREMENT LEVEL settings and the meter readings.

NOTE: The -9 to +9 METER RANGE should be used to facilitate setting the MEASUREMENT LEVEL switches. However, frequency measurement should be made, of a receive signal, with the level indication on the -3 to +3 METER RANGE. Random noise and other tones present must be several dB lower than the signal being measured.

4.4.07 Set the DISPLAY switch to the RECEIVE Hz position.

4.4.08 The frequency of the received tone will be displayed in the six digit display.

4.5 Measuring Circuit Noise and Noise to Ground (N-G)

4.5.01 To make Circuit Noise measurements with the T194C (T194CE) Test Set, the procedures for measuring received tones are used with the following differences.

4.5.02 The WEIGHTING switch is set to one of the five NOISE weighting positions.

	T194C	T194CE
1.	3 k FLAT	(30 Hz to 3 kHz)
2.	C-MSG	(P.53 TEL CKT)
3.	15 k FLAT	(30 Hz to 16 kHz)
4.	PROGRAM	(J. 16 PROGRAM)
5.	50 kb/s	(50 kb/s)

4.5.03 When measuring Circuit Noise, levels between 0 and +100 dBrn (-90 and +10 dBm) plus the meter scale reading can be measured.

4.5.04 Noise to ground (N-G) measurements (T194C) are made as described in Section 4.4 except that the CKT IMPEDANCE switch is set to the N-G position. The sum of the MEASUREMENT LEVEL switch settings and dB meter reading will give the noise to GND (N-G) in dBrn where zero dBrn is 24.5 microvolts. Add 40 dB to obtain the reading in dBrn (600 ohm voltage equivalent). T194CE noise a,b to ground measurements also are made as described in Section 4.4. The CKT IMPEDANCE switch is set to the a,b to GND position. The sum of the MEASUREMENT LEVEL switch settings and dB meter reading will give the noise a,b to GND in dB where zero dB is 24.5 millivolts. Add 40 dB to obtain the reading in dBm (600 ohm voltage equivalent).

4.5.05 If noise measurements are to be made in the presence of a holding tone at any frequency between 995 and 1025 Hz (798 and 822 Hz), place the 1010 Hz (810 Hz) NOTCH toggle switch to IN. The notch filter will automatically tune to the holding tone and attenuate it at least 50 dB.

CAUTION: LOSS OF HOLDING TONE:

For noise with tone measurement be sure the HOLDING TONE PRESENT LAMP is "on" to avoid erroneous readings. Also see Section 2.1.15.

4.6 Measuring Impulse Noise

4.6.01 Impulse noise measurements can be made with the T194C and T194CE. Basically either Test Set, when measuring impulse noise, will count and display the number of times the peak power of noise impulses exceeds a level as determined by the MEASUREMENT LEVEL attenuator.

4.6.02 Impulse noise measurements are made using the following procedure.

4.6.03 Set the LINE SELECT to either RCV I/SEND II or RCV II/SEND I as required.

4.6.04 Set the RECEIVE WEIGHTING switch as required. This would normally be C-MSG (P. 53 TEL CKT) for impulse noise measurements.

4.6.05 If measurements are being made on a compandored carrier system, a 1010 Hz (810 Hz) holding tone would normally be applied to the system. The 1010 Hz (810 Hz) NOTCH filter should be set to the IN position, as described in 4.5.05. When no holding tone is present, use the OUT position. (Refer to "NOTE" following Section 4.6.10).

4.6.06 Set the CKT IMPEDANCE switch to the required position. Select either 600 or 900 ohms.

4.6.07 Set the BRDG-TERM switch to position required.

4.6.08 Set the MEASUREMENT LEVEL switches to the dBrn (dBm) impulse threshold specified for the test being made.

4.6.09 Set the DISPLAY IMPULSE-COUNT interval switch as determined by test requirements. Intervals available are CONT. (continuous), 5, 10, 15 and 30 minutes.

4.6.10 The DISPLAY switch initiates the counting interval when placed in the IMPULSE COUNT position. The COUNTING lamp will be lit while the circuit is counting. When the counting interval is complete, the COUNTING lamp will turn off and the COUNT COMPLETE lamp will turn on. To initiate another counting interval, the DISPLAY switch must be operated to the SEND Hz position and then returned to the IMPULSE COUNT position. This action also sets the digital display to zero.

NOTE: The holding - tone - present circuits and the impulse - count circuits interact causing the COUNTING and COUNT COMPLETE LED's to flash continuously if the holding tone drops below a certain level during counting. This is indicative of an invalid impulse count measurement.

5.0 CIRCUIT DESCRIPTION

5.1 General

A simplified schematic drawing of the T194C/CE is shown in Figure 5-1a, b and c. This diagram shows the function of each circuit assembly in block form and the interconnections among the circuit assemblies in detail. It is useful in following the description of the circuits which follow and can be an aid to locating and isolating trouble.

5.2 Line Connections

5.2.01 External circuits may be connected to the T194C or the T194CE at terminals and jacks designated LINE I and LINE II. Test cords terminated in type 309 or 310 plugs may be connected to the jacks provided. In the T194CE, European triple banana jacks (DIN connectors) for balance circuits are used in place of the 309 and 310 jacks. Wire leads, spade lugs or banana plugs may be used to make the necessary connections to the binding posts. Ground-connection binding posts are also provided.

5.3 Hold & Line Switching, A2

5.3.01 The T194C/CE can measure signals at either the LINE I or LINE II terminals while sending on the other line. The choice is made by means of the interlocking LINE SELECT push button switches.

5.3.02 Provision is also made for dialing and holding on either line. When a DIAL button is pressed, the T&R terminals (a&b in the case of the T194CE) are connected directly to the DIAL and MONITOR square terminal posts and 310-type jack. If both DIAL buttons are pressed, LINE I will be connected to the DIAL posts and LINE II will be open circuited. Pressing the HOLD button for either line connects an electronic holding circuit across the line.

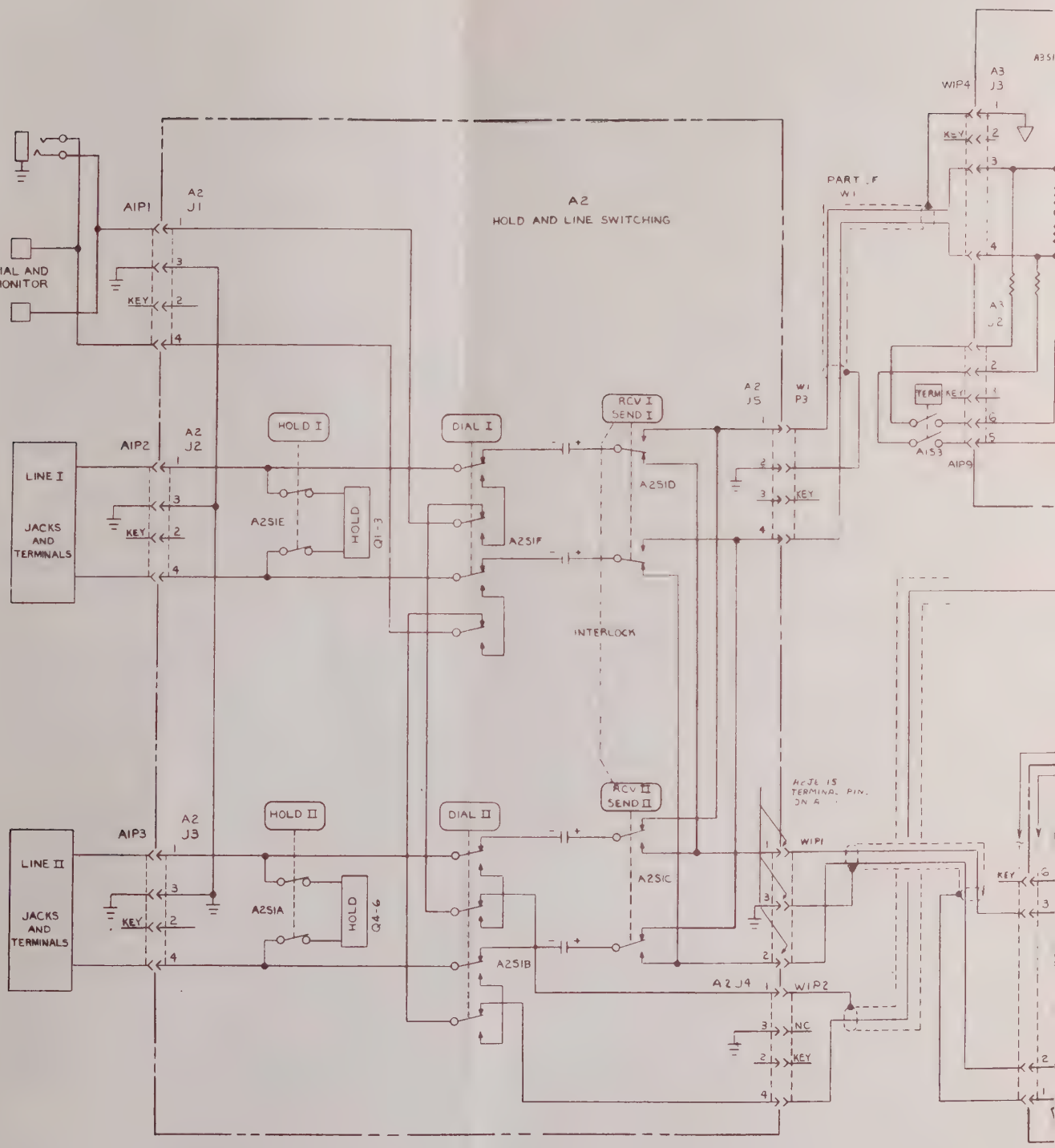
5.3.03 When dialing and holding a line the procedure is first to dial using a lineman's test handset connected to the DIAL posts or 310 jack; next to engage the HOLD button; and finally to release the DIAL button.

5.3.04 Figure 8-1 is a detailed schematic of the hold and line switching circuits and figure 8-2 is the printed circuit board layout drawing.

5.4 Preamplifier and Weighting Circuits, A3

5.4.01 Figure 8-3 is a detailed schematic drawing of the Preamp and Weighting circuits for the T194C and Figure 8-4 is the printed circuit board layout drawing. Figures 8-21 and 8-22 are the corresponding drawings for the T194CE. The Simplified Schematic is shown in Figure 5-1a.

5.4.02 The line selected for receive by the LINE SELECT push button is connected through dc blocking capacitors in the hold and line switching circuit board to the input of the preamplifier and weighting board. From there the line is connected through the impedance switching circuits of S1C, D, E & F to the primary of transformer T1. In the CAL SEND position of this switch,


A2
HOLD AND LINE SWITCHING
DIAL AND MONITOR
A1P1
A2 J1
KEY
A1P2
A2 J2
LINE I
JACKS AND TERMINALS
HOLD I
DIAL I
RCV I SEND I
A2S1E
HOLD Q1-3
A2S1F
A2S1D
INTERLOCK
A1P3
A2 J3
LINE II
JACKS AND TERMINALS
HOLD II
DIAL II
RCV II SEND II
A2S1A
HOLD Q4-6
A2S1B
A2S1C
A2 J5
W1 P3
PART OF W1
A3 J3
WIP4
TERM
A1S3
A1P9
A2 J4
WIP2
WIP1
NC
ACJE 15 TERMINAL PIN ON A

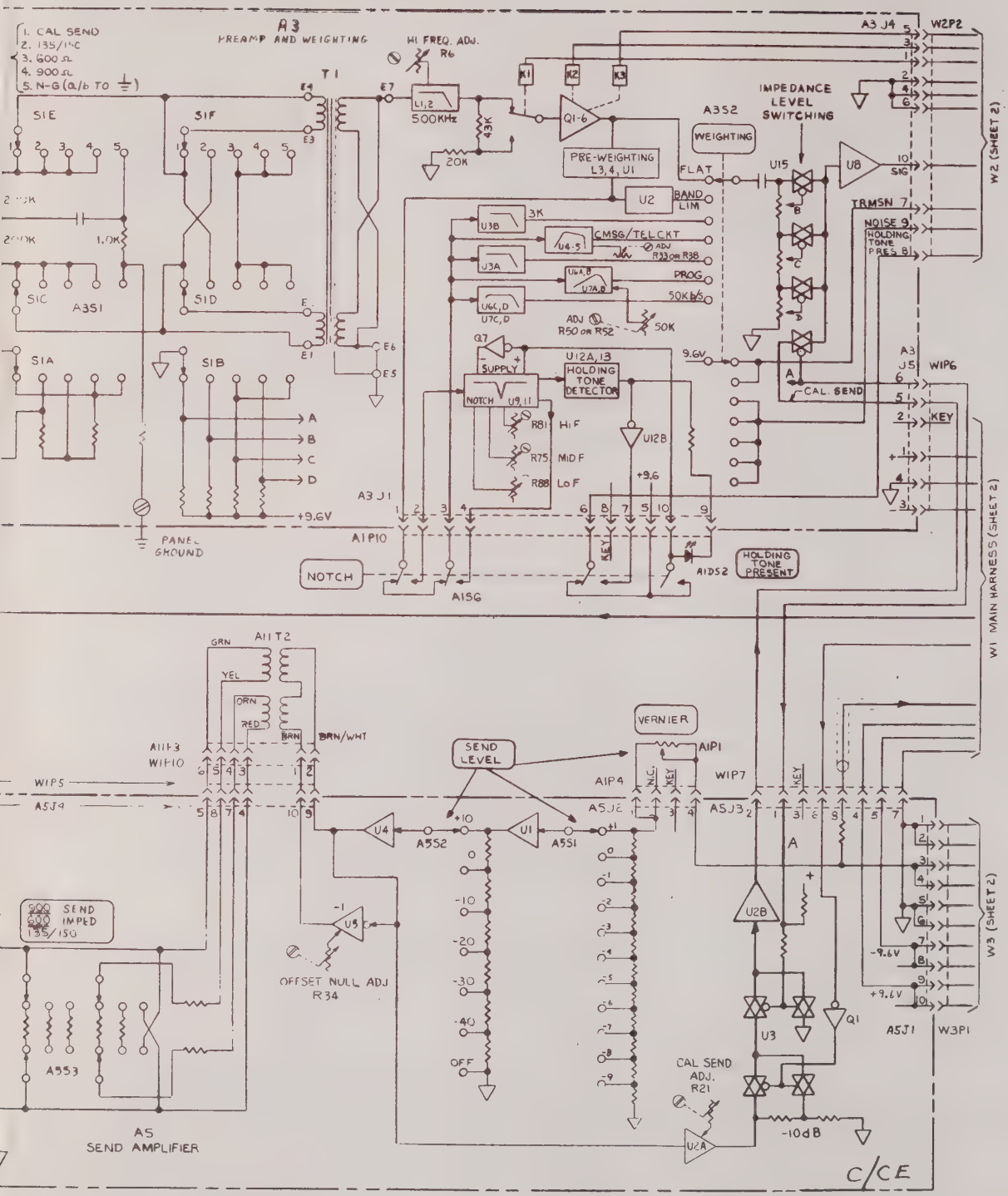
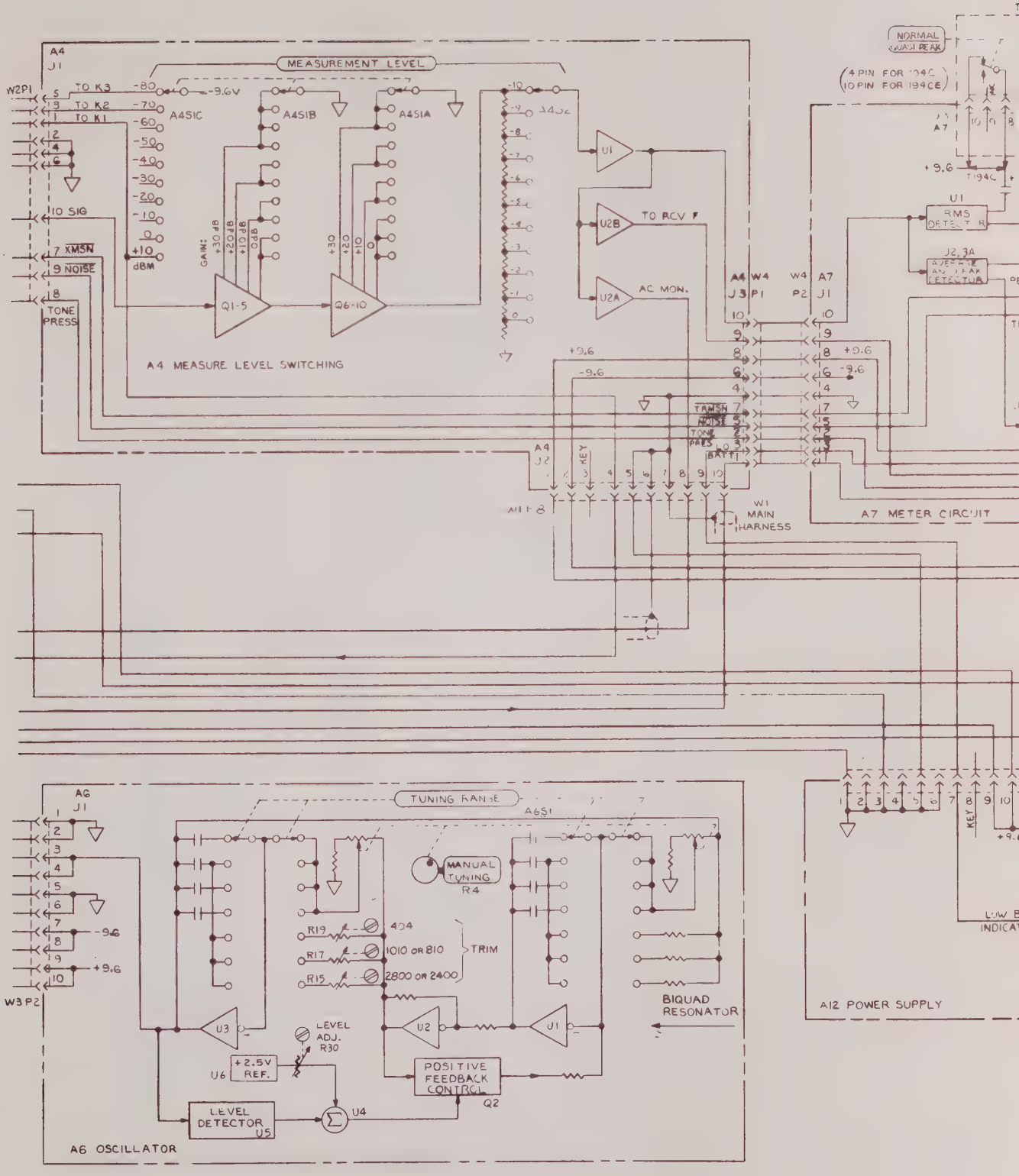
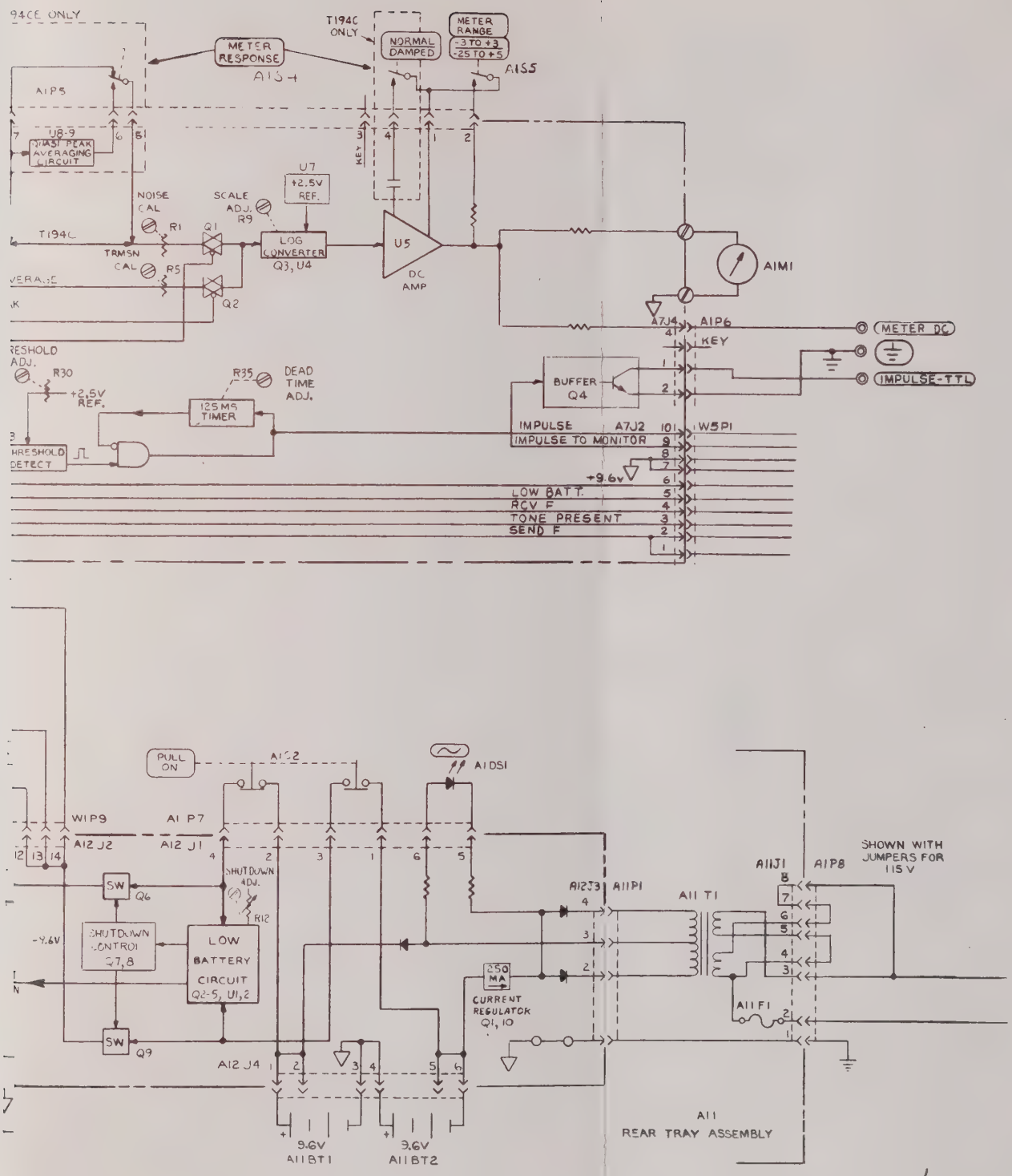


FIGURE 5-1a
Simplified Schematic


A4
J1
MEASUREMENT LEVEL
W2P1
TO K3
TO K2
TO K1
-80
-70
-60
-50
-40
-30
-20
-10
0
+10
dBM
-9.6V
A4S1C
A4S1B
A4S1A
GAIN:
+30 dB
+20 dB
+10 dB
0 dB
+30
+20
+10
0
Q1-5
Q6-10
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
10 SIG
7 XMSN
9 NOISE
8 TONE PRESS
U1
U2B
TO RCV F
U2A
AC MON.
A4 MEASURE LEVEL SWITCHING
A4 W4
J3 P1
W4 A7
P2 J1
+9.6
-9.6
XMSN
NOISE
TONE PRES
BATT
A4
J2
KEY
W1
MAIN
HARNESS
A7 METER CIRCUIT
NORMAL
QUASI PEAK
(4 PIN FOR 194C
10 PIN FOR 194CE)
A7
+9.6
194C
U1
RMS
DETECTOR
J2,3A
AVERAGE
AND PEAK
DETECTOR
A6
J1
W3 P2
-9.6
+9.6
TUNING RANGE
A6S1
MANUAL
TUNING
R4
R19
R17
R15
404
1010 OR 810
2800 OR 2400
TRIM
U3
U2
U1
BIQUAD
RESONATOR
LEVEL
ADJ.
R30
U6
+2.5V
REF.
POSITIVE
FEEDBACK
CONTROL
Q2
LEVEL
DETECTOR
U5
U4
A6 OSCILLATOR
A12 POWER SUPPLY
KEY
+9.6



C/CE

FIGURE 5-1b
Simplified Schematic

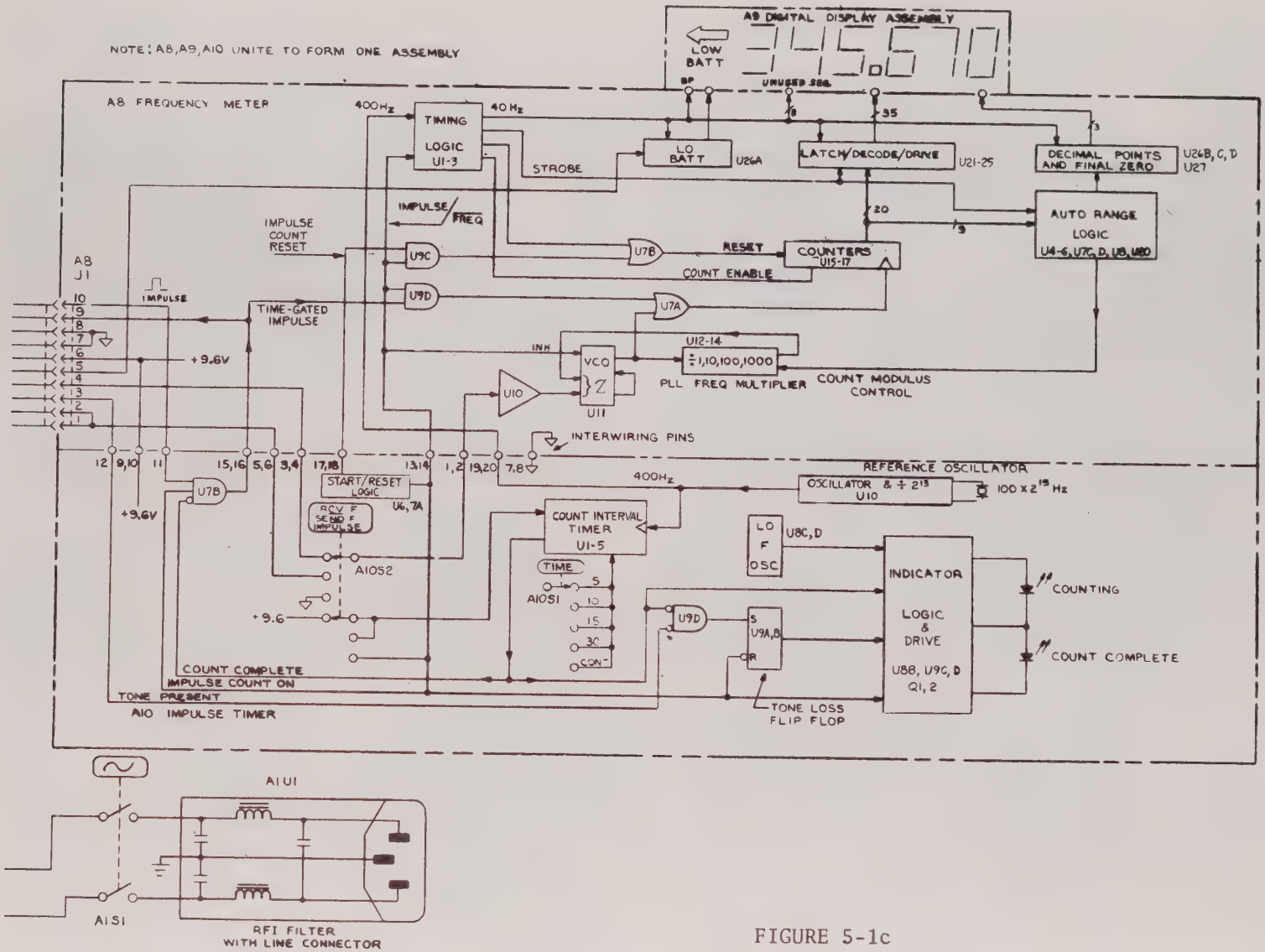


FIGURE 5-1c
Simplified Schematic

the transformer primary is short circuited. In the 135 or 150 ohm position the two halves of the primary are connected in parallel. In the 600 and 900 ohm positions they are connected in series. In the Noise-to-Ground position (designated a,b to GND in the T194CE) the transformer primary is connected across a one kilohm resistor. One end of this resistor is essentially at ground while the other end is connected through a dc blocking capacitor with a 200 kilohm resistor to each side of the line. Thus the voltage across this resistor is 1/100 of the voltage to ground on the two sides of the line taken together. S1A determines the value of the actual terminating resistance, connected through the TERM/BRDG switch A1S3. If switch A1S3 is in the TERM position with either CAL SEND or N-G selected, the receive line is terminated with 900 ohms. S1B provides control voltages for other impedance-related functions.

5.4.03 The transformer secondary is connected to the preamplifier through a passive 500 kHz low-pass filter which is included for suppression of RF interference. Since the T194C/CE covers four full decades of measurement frequency range, it is difficult to obtain a flat frequency response over the full range. The high frequency response adjustment, R6, provides a means for optimizing the combined transformer and filter response at the high frequency end of the operating range.

5.4.04 The discrete-component preamplifier, Q1-Q6, has a voltage gain of approximately 3 except in the two most sensitive ranges where it is increased by 10 and 20 dB through the action of Relays K2 and K3. In the least sensitive range the input is attenuated 10 dB through the action K1.

5.4.05 The preamplifier output is taken directly to the flat FULL RANGE position of the WEIGHTING switch. For all other positions of this switch the signal passes first through a pre-weighting low-pass circuit having a cutoff at about 50 kHz, with buffer amplifier U1.

5.4.06 The several frequency weighting circuits provided are summarized as follows:

BAND LIMITED 200 Hz - 20 kHz, formed from high pass active filter U2A and low pass U2B;

3 k FLAT (designated 30 Hz - 3 kHz in T194CE) from low pass filter U3B;

C-MSG, from filter U4 and U5. (The corresponding filter in T194CE is designated P53 TEL CKT psophometric weighting.) Gain adjustments are provided for these filters, R33 for the C-MSG or R38 for the TEL CKT;

15 kHz Flat (30 Hz - 16 kHz for T194CE), from low pass filter U3A;

PROGRAM, from U6A and U6B and U7A and U7B, designed to PUB41009 requirements in the T194C and to CCITT J.16 (CCIR 468-1) in the T194CE. Gain adjustments for the PROGRAM filters are R50 in the T194C or R52 in the T194CE.

50 kb/s, from U6C & D and U7C & D is a weighting designed for use in 50 kilobit data circuits. It approximates the function $A(1+\cos A)/2 \sin A$, where $A = \pi f/50{,}000$ Hz.

5.4.07 In any of the noise weighting positions a notch filter may be inserted for making noise-with-tone measurement. The notch is formed of 3 bi-quadratic tuned circuits comprising U9, U10 and U11. The three sections are tuned for proper response by means of R75, R81 and R88. The notch center frequency is 1010 Hz for the T194C and 810 Hz in the T194CE.

5.4.08 When the notch filter is selected, a phase-locked-loop circuit U12 and U13 is used to detect the presence of a signal within the notch frequency. This circuit is used to drive an indicator on the front panel indicating that a holding tone is present. Loss of holding tone is also used to indicate an error in impulse count.

5.4.09 The output of the WEIGHTING switch goes to an attenuator circuit controlled by transmission gates of U15 which adjust to the proper input reference level for the impedance selected. In the CAL SEND position the signal from the WEIGHTING switch is disconnected and a signal from the output amplifier is introduced through U15A for the purposes of calibrating the SEND level.

5.5 Measurement Level Switching, A4

5.5.01 The next assembly is the Measurement Level Switching. Figure 8-5 is a detailed schematic of this section and Figure 8-6 is the printed circuit board layout drawing. Figure 5-1b is the Simplified Schematic.

5.5.02 The first part of the Measure Level Switching is a two-stage discrete-component amplifier circuit. The first stage consists of Q1-Q5 and the second of Q6-Q10. The gain of this circuit is switchable in 10 dB steps by means of S1A & B, while S1C controls the relays K1, 2 and 3 in the preamp circuit.

5.5.03 The signal is next attenuated in 1 dB steps and fed to S2. S1 and S2 together are the MEASUREMENT LEVEL AND IMPULSE THRESHOLD switches. Outputs from the measurement level switching circuit go to the meter circuit, to the frequency measurement circuit, and to the ac monitor. The ac monitor signal is connected to the DIAL and ac MONITOR terminals and jack whenever neither of the DIAL push buttons is pressed.

5.6 Meter Circuit, A7

5.6.01 Figure 8-11 is the detailed schematic drawing and Figure 8-12 is the printed circuit board layout drawing for T194C. Figures 8-27 and 8-28 are the corresponding drawings for the T194CE.

5.6.02 Three types of signal level detection are provided in the meter circuit:

1. A true rms output, derived in integrated circuit U1, is used for all steady-state noise measurements.
2. An average-absolute-value detector circuit is used for transmission level measurements in the BAND LIMITED and FULL RANGE position of the WEIGHTING switch. The average-absolute-value detector is used in place of the rms detector for signal level measurement because it is less susceptible to error caused by the presence of noise along with the signal being measured.
3. The absolute-value peak, used for impulse counting.

5.6.03 U2 and U3A comprise a fast-acting absolute value circuit. Both positive and negative peaks of the input signal appear at the output of U3A as positive peaks, which are then compared to a reference threshold in U3B for impulse counting.

5.6.04 A dc analog of either the rms level from U1, or the average absolute value from the Average and Peak Detector circuit U2 and U3A, is selected in Q1 and Q2 and is controlled by the WEIGHTING switch. The signal next passes through log converter Q3 and U4, and dc amplifier U5, to the zero-center meter. Meter range is switched by changing the gain of U5.

5.6.05 Impulse counting is normally done with the weighting in one of the noise (psophometer) positions, but can also be made in the transmission positions. The threshold level at U3B is set to equal the peak absolute value voltage of an impulse whose instantaneous peak power is equal to the impulse threshold setting selected by the MEASUREMENT LEVEL switches. A sinewave input at a level 3 dB below the MEASUREMENT LEVEL switch setting will have instantaneous peak power equal to the threshold and will be just sufficient to cause the impulse counter to register.

5.6.06 An impulse peak, exceeding the threshold level at U3B will trigger monostable multivibrator U6B producing a short (1 ms) output pulse to the impulse counter. This pulse also triggers a second monostable multivibrator U6A whose output prevents any further triggering of U6B until the completion of a dead time. This dead time is nominally 125 ms, corresponding to a maximum count rate of 8 counts per second.

5.6.07 In the T194C, a simple meter damping circuit is provided for steady-state measurement. With switch A1S4 in the DAMP position, a capacitor is added in the feedback circuit of U5 slowing the response of the meter. In the T194CE the simple meter damping circuit is replaced by a more elaborate quasi-peak averaging circuit in accordance with CCITT recommendation J.16 (CCIR recommendation 468-1). The quasi-peak circuit takes the dc analog of rms level, ahead of the log converter, and puts it through a circuit comprising U8 and U9 that allows the indication to rise rapidly when a noise burst occurs and to fall off more slowly after the noise burst. The detailed characteristics of the quasi-peak response are covered in CCITT J.16 (CCIR 468-1).

5.7 Impulse Count Timer, A10

5.7.01 The Impulse Count Timer assembly is physically mounted to the frequency meter assembly. It contains the impulse time switching and also the DISPLAY switch which selects either impulse count or SEND or RECEIVE frequency measurement. The impulse count timer is shown in detailed schematic Figure 8-16. The printed circuit layout is shown in Figure 8-17.

5.7.02 The DISPLAY switch, S2, generates a control signal which determines whether the frequency measurement and display circuit operates as a frequency counter or as an event counter. When S2 is first turned to the IMPULSE COUNT position it generates a reset pulse which clears the display and starts the impulse count timer. After an impulse count, the display may be cleared and a new count started by turning the switch momentarily to one of the frequency measurement positions and then back to the IMPULSE COUNT position.

5.7.03 When S2 is turned to the IMPULSE COUNT position, U6 and U7A generate a 2.5 ms reset pulse to clear the display. This pulse also resets the timer to zero.

5.7.04 Following the reset pulse, any impulse which may be present from the meter circuit is gated through U7B to the counter circuit. At the same time the timer U1 through U5 begins counting the 400 Hz clock input. When the time selected by switch S1 is achieved, gate U7B is turned off preventing any further impulse from being transmitted to the counter circuit. With S1 in the CONT (continuous) position, the timer does not operate; counting continues until it is stopped by switching S2.

5.7.05 Whenever S2 is in the IMPULSE COUNT position the COUNTING/COUNT COMPLETE display circuit is activated and one of the two indicators is on, depending on the signal to driver Q1 and Q2. If the 1010 Hz (or 810 Hz) notch is not selected, a positive logic level will be present on the tone-present line. In this condition Q2 and DS1 are on while impulses are being counted, and Q1 and DS2 come on when the selected time is achieved and counting stopped. If the notch is selected, the tone-present line will be high only if the holding tone is present. Loss of holding tone during the counting interval will set latch U9A, U9B, gating the output of low-frequency oscillator U8C, U8D into the display drivers Q1 and Q2. The oscillator will cause the COUNTING and COUNT COMPLETE indicators to flash alternately, indicating that the registered impulse count is not valid. This flashing will continue until the latch and the display are cleared by turning S2 to one of the frequency count positions.

5.7.06 The impulse timer assembly also contains a crystal controlled oscillator and frequency divider U10. The crystal frequency is 100×2^{15} Hz. Division by 2^{13} produces a 400 Hz signal, which is used as the clock for the count interval timer and also for the frequency counter time base in frequency meter A8.

5.8 Frequency Meter and Display Circuit, A8, A9

5.8.01 Figure 8-13 is a detailed schematic drawing of the Frequency Meter and Display circuit and figures 8-14 and 8-15 is the circuit board layout drawing.

5.8.02 This circuit serves the dual function of acting as a frequency counter for the frequency measurement or as an event counter for impulse counting. In the frequency count mode the circuit uses the phase-locked-loop frequency multiplier scheme with auto-ranging through four decade ranges. This provides fast update and high resolution for frequency measurement in all ranges.

5.8.03 For frequency count, the SEND or RECEIVE signal to be measured is switched through S2 of the Impulse Timer circuit and through buffer amplifier U10 to the phase-locked-loop circuit U11. The VCO output of the phase-locked-loop, in the lowest frequency range, is divided by 1000 in U12-14 and the divider output is phase-compared to the input signal at U11, thus multiplying the input frequency by 1000. The VCO output passes through U7A to the counters U15 through U17. Counter outputs are coupled to the latch/decode/drive circuits U21 through 25 and thence to the liquid crystal display.

5.8.04 The timing circuits of U1 through U3, for each update cycle, first generate a reset pulse which clears the counter, next enable the counter for a 100 ms interval, and then strobe the counter outputs into the latch/decode/-drive circuits. Counting 1000 times the input frequency over a 100 ms interval gives a resolution of 1/100 of a Hz. Range logic circuits position the display decimal point after the third of five digits, providing a display resolution of 1/100th of a Hz.

5.8.05 If the content of the counter exceeds 39 999, the auto-range logic comprising U4 through 6, two sections of U7, U8 and U20 will cause the phase-locked-loop frequency multiplier count modulus to change from 1000 to 100. The decimal point will now move to the position following the fourth digit for a display resolution of 1/10 of a Hz. If the 39 999 count is still exceeded, count modulus will switch to 10 and the display will show Hz to five digits. Finally, for frequencies above 39 999 Hz the modulus will change to one and an additional zero will be turned on at the right hand end of the display. The display now shows Hz to six digits but with a resolution of 10 Hz; the final digit is zero in the highest frequency range and blank in the other ranges.

5.8.06 Down-ranging occurs when U20 indicates a count of less than 2000. Thus there is considerable hysteresis between frequency ranges. This means that the full extent of any one frequency range of the T194C/CE oscillator circuit can be measured within one range of the auto-ranging frequency measurement circuit.

5.8.07 When impulse count is selected, the phase-locked-loop VCO is inhibited. The time-gated impulse from the impulse timer is gated through U9D to the counters U15 through U17. During impulse count, the timing logic in U1 through U3 generates no reset pulse. Reset is provided only from the impulse count timer, and is gated through U9C. Also, the timing logic holds the strobe line high, so that the counter content is transmitted continuously to the latch/decode/drive circuits and the display is continually updated as each impulse count occurs.

5.8.08 The frequency display circuit also includes a low battery indicator. The low battery signal is switched through U26A and appears as an arrow at the left hand end of the display.

5.9 Oscillator, A6

5.9.01 Figure 8-9 is the detailed schematic drawing of the T194C Oscillator circuit and figure 8-10 is the printed circuit board layout drawing. Figures 8-25 and 8-26 are the corresponding drawings for the T194CE Oscillator, which differs only in a few component values.

5.9.02 The T194C/CE Oscillator is tuneable by means of a multi-turn precision pot with a dual ratio mechanical drive mechanism. There are four switch-selectable tuning ranges, each covering a full decade with overlap at each end. The range switch also has three preset frequency positions.

5.9.03 The Oscillator itself is a three-amplifier bi-quadratic tuned circuit comprising integrators U1 and U3 and inverter U2. Positive feedback from U2 and U1 causes the circuit to oscillate at the resonant frequency. The output level is detected in U5 and compared in U4 with a precision reference that is derived from U6 and the level calibrate adjustment R30. The resulting error signal controls Q2, which determines the amount of positive feedback and thus regulates the oscillation level.

5.10 Send Amplifier, A5

5.10.01 Figure 8-7 is the detailed schematic drawing of the T194C Send Amplifier and figure 8-8 is the printed circuit board layout drawing. Figures 8-23 and 8-24 are the corresponding drawings for T194CE.

5.10.02 Signal from oscillator A6 to send amplifier A5 is first adjusted in the level vernier, A1R1, and then fed to a 1 dB step attenuator, the outputs of which are selected by the 1 dB step SEND LEVEL switch, S1. The signal next passes through buffer U1 to the 10 dB step attenuator and 10 dB step SEND LEVEL switch S2.

5.10.03 S2 output is amplified in U4 and inverted in U5. The signals from U4 and U5 are fed to the series-connected primary windings of output transformer, A11T2.

5.10.04 Signal from the output transformer secondary next passes through an impedance build-out network controlled by the SEND IMPEDANCE switch, S3. This network provides the output impedance selected, and also adjusts the voltage to the proper level for the selected impedance. The transformer secondary windings are parallel-connected for the 135 or 150 ohm output impedance and series-connected for 600 and 900 ohms.

5.10.05 Signal from U4 output is also fed to the CAL SEND circuit. This signal is buffered in U2A and calibrate-adjusted in R21, and then fed to 10 dB attenuator R46-R47. When calibrating send level with the MEASURE LEVEL 10 dB step switch in the +10 dB position, it is necessary to attenuate the signal here by 10 dB because it does not pass through the 10 dB attenuator in the preamplifier circuit controlled by U1. This attenuation is controlled by Q1 and the first half of transmission gate integrated circuit U3.

5.10.06 When the CAL SEND function is selected, a low level signal, point A*, switches the CAL SEND signal through the second half of U3 to buffer U2B. When CAL SEND is not selected the input of U2B is grounded. The output of U2B is the CAL SEND signal to the preamp and weighting circuit. Double switching of this signal, is necessary to avoid crosstalk when the CAL SEND function is not being used.

5.10.07 The output signal from the Send Amplifier is fed to the Hold and Line Switching assembly, A2, and then through the LINE SELECT switches to either LINE I or LINE II.

5.11 Power Supply, A12

5.11.01 Figure 8-19 is the detailed schematic of the T194C/CE Power Supply and figure 8-20 is the printed circuit board layout drawing. The printed circuit assembly portion of the power supply is designated A12. Other power supply components are located separately on the rear tray assembly, A11 Figure 8-18, or on the front panel assembly A1.

5.11.02 The ac line voltage from the inlet connector on the front panel is fed through RF filter A1U1, line switch A1S1, and fuse A11F1 to the power transformer A11T1. The two primaries of T1 are parallel-connected for 100 to 130 volt operation and series-connected for 200 to 250 volt operation.

5.11.03 The transformer secondary is connected to rectifier circuit D1-D2 on the printed circuit assembly A12, thence through the current regulator circuit Q1, Q10, Q11 to the Ni-Cad batteries A11BT1 and A11BT2. The current regulator regulates at approximately 250 milliamps which is slightly above the so-called c/10 charging rate for the batteries. It is also sufficient to provide the

*Simplified Schematic Assemblies A3 and A5 Figure 5-1a.

full operating current for the T194C or T194CE, with enough margin to provide a slow charge to the batteries during ac line operation of the set. During ac line operation, the batteries float across the dc supply and provide ripple filtering and dc voltage regulation. If the ac line is not connected, or if the ac line switch S1 on the front panel is turned off, the batteries will provide the operating power for the set.

5.11.04 The PULL ON switch, A1S2, connects the batteries to the operating circuits of the set through the low battery shutdown circuits.

5.11.05 The low battery detector circuit of Q2 and Q4 produces, at the collector of Q4, a negative voltage with an absolute value equal to the smaller absolute value of the voltage in BT1 or BT2. This voltage is compared with a positive reference from U2 at inverting inputs of op-amps U1A and U1B, which are used as comparators. The circuit is adjusted so that if either battery voltage drops below 9.68 volts (1.21 volts per cell) the output of U1B will go low turning on Q5 and signaling low battery to the display. A further drop to 9.52 volts (1.19 volts per cell) will cause the output of U1A to go low, turning off transistors Q6 through Q9, shutting down the set and reducing the battery drain to the small trickle through the low battery detector. Thus the possible cell reversal caused by deep discharge of multi-cell Ni-Cad batteries is avoided.

6.0 MAINTENANCE and OPERATIONAL CHECKS

6.1 General

6.1.01 All Wilcom Products Inc. test equipment is warranted against defects in materials and workmanship for a period of one year from the date of delivery. Complete details of the warranty can be found on the inside front cover of this manual.

6.1.02 Field repair of this test set in NOT recommended unless the repair will be made in a well equipped repair center. The technicians performing the repair should be familiar with digital circuitry, logic functions and state of the art semiconductor design.

6.1.03 In the event of troubles, it is important that the Operational Checks described in 6.2, 6.3 and 6.4 be performed BEFORE any attempts are made to repair the test set. By following this procedure, it can be determined if the problem is real or results from improper operation of the test set.

6.1.04 If the trouble cannot be found and corrected by following the procedures of 6.2 through 6.4, reference can be made to the block diagrams of Figure 5-1 the circuit description of section 5, and the procedures of 6.5 and 7.0.

6.1.05 If local repair is not possible, it is suggested that the complete test set be returned for repair with information regarding the suspected trouble.

6.1.06 After any repairs, not made by Wilcom Products, Inc. The test set should be re-aligned. Section 7.0, Alignment and Calibration, describes the methods and equipment required. In most cases it will not be necessary to repeat the whole of this procedure, but only applicable portions.

6.2 Operational Checks, General

6.2.01 Location of trouble within the T194C (T194CE) can often be expedited by making a few simple operational tests. All of these tests can be done without removing the set from its case, and without using any test equipment except patch cords and the T194 itself. More detailed tests are described in the Alignment and Calibration procedure, Section 7.0.

6.3 Operational Checks Transmission Measurements

6.3.01 Following the SEND LEVEL calibration procedures given in Section 4.3 of this manual will verify proper operation. The calibration procedure should be repeated for each frequency range by selecting a frequency near the middle of each of the four frequency ranges.

6.3.02 The calibration also should be performed at each impedance at a frequency of 1000 Hz (800 Hz).

6.3.03 The function switching can be verified by connecting LINE I to LINE II with a patch cord and verifying that the test set can be calibrated by setting the LINE SELECT switch first to RCV I SEND II position and then to the RCV II SEND I position. Calibration of the test set should be possible in both positions.

6.3.04 If, after performing the operational checks outlined in the previous paragraphs, the test set performs satisfactorily it can be safely assumed that the test set is operating properly when used for transmission measurements. If not, consult REPAIR PROCEDURE, Section 6.5, for aid in isolating the probable cause of trouble.

6.4 Operational Checks Noise Measurements

6.4.01 When using the Model T194C (T194CE) Test Set to make noise measurements, the only additional circuits involved are the Weighting Circuits. There are five weighting networks used when making noise measurements. They may be evaluated as described in the following paragraphs.

6.4.02 The 15K noise weighting network can be checked by making a relatively simple transmission test. Figure 2-3 shows the response characteristic of this network. Proceed as follows:

1. Patch the LINE I terminals to the LINE II terminals.
2. Set the RECEIVE, CKT IMPEDANCE switch to the CAL SEND position. (Refer to 4.3.01)
3. Set the DISPLAY switch to the SEND HZ position.
4. Set the TUNING range switch to the 300-3K position.
5. Set the TUNING control to read a send frequency of 1000 Hz (800 Hz) on the digital display.
6. Set the SEND LEVEL attenuators to 0 dBm.
7. Set the SEND IMPEDANCE switch to 600.
8. Set the BRDG-TERM toggle switch to TERM position.
9. Set the 1010 (810) Hz NOTCH toggle switch to the OUT position.
10. Set the MEASUREMENT LEVEL attenuators at 0 dBm (use red scale).
11. Adjust the SEND LEVEL VERNIER for a 0 dB reading on the MEASUREMENT LEVEL meter.
12. Set the WEIGHTING switch at the 15K FLAT (16K Hz) position.
13. Press the RCV I/SEND II push button.
14. The LEVEL meter should read 0 dBm within ±0.1 dB.
15. Re-adjust the SEND LEVEL VERNIER, if necessary, for a 0 dB reading on the LEVEL meter.
16. Set the TUNING range switch to the 3K-30K position.
17. Set the TUNING control to read a send frequency of 30,000 Hz on the digital display.
18. The requirement for the receive level is -12 ±3 dBm.

6.4.03 The 3 kHz flat noise weighting network can be checked in a manner similar to that described in paragraph 6.4.02 above. Figure 2-1 also shows the response of this network. Proceed as follows:

1. Repeat steps 1 through 11 of paragraph 6.4.02.
2. Set the WEIGHTING switch at the 3 K FLAT position.
3. Press the RCV I/SEND II push button.
4. The LEVEL meter should read 0 dB within ±0.1 dB.
5. Re-adjust the SEND LEVEL VERNIER, if necessary for a 0 dB reading on the LEVEL meter.
6. Set the TUNING range switch to the 3K-30K position.
7. Set the TUNING control to read a send frequency of 6000 Hz on the digital display.
8. The requirement for the receive level is -12 dBm ±3 dB.

6.4.04 The C-MSG (P.53 TEL CKT) weighting network can be checked in manner similar to that described in paragraph 6.4.02. Figure 2-2 (C-MSG) or Figure 2-6 (P.53 TEL CKT) shows the response characteristics of these networks. Proceed as follows:

1. Repeat steps 1 through 11 of paragraph 6.4.02.
2. Set the WEIGHTING switch at the C-MSG (P.53 TEL CKT) position.
3. Press the RCV I/SEND II push button.
4. The LEVEL meter should read 0 dB within ±0.1 dB.
5. Re-adjust the SEND LEVEL VERNIER, if necessary for a reading of 0 dB on the LEVEL meter. Check the receive level at two or three frequencies chosen from the appropriate response curve.

6.4.05 The PROGRAM weighting network can be checked in a manner similar to that described in paragraph 6.4.02. Figure 2-4 (Figure 2-8 T194CE) shows the response characteristic of this network. Proceed as follows:

1. Repeat steps 1 through 11 of paragraph 6.4.02.
2. Set the WEIGHTING switch to the PROGRAM position.
3. Press the RCV I/SEND II push button.
4. The LEVEL meter should read 0 dB within ±0.1 dB.
5. Re-adjust the SEND LEVEL VERNIER, if necessary, for a 0 dB reading on the LEVEL meter.
6. Check the receive level at two or three frequencies chosen from the Program Weighting response curve of Figure 2-4 (2-8).

6.4.06 The 50 kb/s weighting network can be checked in a manner similar to that described in paragraph 6.4.02. Figure 2-5 shows the response characteristic of this network. Proceed as follows:

1. Repeat steps 1 through 11 of paragraph 6.4.02.
2. Set the WEIGHTING switch to the 50 kb/s position.

3. Press the RCV I/SEND II push button.

4. The LEVEL meter should read 0 dB within ±0.1 dB.

5. Re-adjust the SEND LEVEL VERNIER, if necessary, for a 0 dB reading on the LEVEL meter.

6. Check the receive level at two or three frequencies chosen from the 50 kb/s weighting response curve of Figure 2-5.

6.4.07 The Noise-Ground input circuitry may be checked in the following manner:

1. Strap the T and R terminals of LINE I together.

2. Patch the T terminal of LINE II to T&R of LINE I, and the R terminal of LINE II to ground at the LINE I terminals.

3. Repeat steps 2 through 13 of 6.4.02.

4. Set the RECEIVE, CKT IMPEDANCE switch to the N-G position.

5. The level reading should be -34 dBm ±1 dB.

6.4.08 The rejection characteristics of the 1010 (810) Hz NOTCH filter may be checked as follows:

1. Repeat steps 1 through 13 as given in paragraph 6.4.02.

2. Operate NOTCH filter switch to the IN position.

3. Adjust the 10 dB MEASUREMENT LEVEL attenuator to the -50 dBm position. The LEVEL meter should read near 0 dB on the meter or lower.

6.4.09 Impulse Noise measuring capabilities can be checked by the following method:

1. Repeat steps 1 through 13 of paragraph 6.4.02.

2. Set the IMPULSE COUNT time switch to CONT. position.

3. Set DISPLAY switch to the IMPULSE COUNT position.

4. The digital display should read a number which increases steadily at approximately 7 counts per second.

5. Set the MEASUREMENT LEVEL 1 dB step attenuator at -2 and use the SEND LEVEL VERNIER to gradually reduce the send level.

6. The digital display should stop counting when the meter reads - 3 dB ±.5 dB.

6.5 Repair Procedure

6.5.01 The Operational Checks of 6.2 through 6.4 should give a good indication of trouble location. The next step is to remove the set from its case.

CAUTION: DO NOT REMOVE ANY SCREWS FROM THE FRONT PANEL.

Take out three screws from the top of the case, near the carrying handle, and three from the bottom. Grasp the set by the front panel handles and pull it from the case.

6.5.02 A good visual inspection may give a quick solution to the problem. Look for loose connectors, solder connections or component parts which have been jarred loose or broken, or any other visual clues. Pay particular attention to areas where the operational checks have indicated trouble. Reference to Figure 8-29 or 8-30 will help identify these areas.

6.5.03 For better access to circuits, it may be desirable to remove the rear tray assembly. DISCONNECT BOTH THE AC LINE AND THE BATTERY PACK. Remove the flat-head screws which hold the tray to two of the mounting brackets. Disconnect rear assembly connectors as necessary to slide the entire assembly out. The rear assembly and then the ac line may now be reconnected and the set operated for test purposes. If the fault is not apparent at this point, detailed trouble shooting may continue as outlined in 6.1.04.

6.5.04 If difficulty is encountered, either individual circuit boards or the entire set should be returned to Wilcom for repair.

7.0 CALIBRATION and TEST PROCEDURES

7.1 General

7.1.01 This section provides procedures needed to calibrate the Model T194C and T194CE Transmission & Noise Test Sets. The calibration procedures described here can be made by field personnel using standard test equipment. Refer to the simplified schematic Figure 5-1 for identification of all the adjustments described and to the Printed circuit layout figures (Section 8.0) for each assembly to physically locate the adjustments. The location of each P.C. Assembly is shown in Figures 8-29, 8-30 and 8-31.

7.1.02 The operational checks of 6.0 should be performed before any attempt is made to calibrate the T194C/CE. If these checks reveal any fault in the test set it should be repaired before calibration.

7.1.03 The ac line power must be removed from the test set during all disassembly or assembly operations and reapplied for testing. The set should be stabilized at room temperature for at least 1/2 hour, and power applied for at least 5 minutes, before calibration.

7.1.04 The set must be removed from its case for calibration. DO NOT REMOVE ANY SCREWS FROM THE FRONT PANEL. Remove three screws from the top surface of the case near the front edge and three from the bottom surface near the front edge. Grasp the handles on the set and pull forward.

7.1.05 For access to most of the circuit adjustments the rear panel assembly must be shifted from its normal position. Remove the center of the three metal bands which hold the rear assembly in place. Then remove the screws holding the assembly to the other two bands. The entire rear tray assembly can then be shifted slightly to the right and the left hand end swung outward for access to the other assemblies. This can be done without disconnecting any of the electrical connections to the rear tray assembly. The set can be operated with the rear assembly in this position for test and calibration purposes.

7.2 Equipment Required

Precision electronic ac voltmeter or level meter accurate to within ±.05dB from 30 Hz to 300 kHz.

Digital dc voltmeter with .01 volt or better resolution at 10 volts.

Precision resistors, attenuator pads, patch and test cords as described in the procedure. These can be prepared by test personnel as required.

Two adjustable dc power supplies (or one dual supply with separate adjustments) with output adjustable to 10 volts at 250 milliamps.

A general purpose oscilliscope and other general purpose test equipment will also be helpful.

7.3 Power Supply, A12 and Part of A11

7.3.01 Power supply calibration consists of setting the point at which the automatic shutdown circuit operates when the batteries are discharged. AC line voltage should not be connected to the set during power supply calibration.

7.3.02 Disconnect batteries BT1 and BT2 and connect the variable dc power supplies in their place. Be sure polarity is correct. Adjust the output voltage of each supply to 10 volts.

7.3.03 Turn the set on, using the PULL ON switch, and observe that the digital display operates and that the low battery indicator is not on.

7.3.04 Reduce the voltage of one of the supplies to 9.68 volts (1.21 volts per cell)

7.3.05 Turn the low battery shutdown adjustment R12 until the low battery indicator just comes on. This is the only adjustment in the power supply. What follows are checks for proper adjustment.

7.3.06 Continue to slowly reduce the voltage of the first power supply and observe that when it reaches 9.54 volts (1.19 volts per cell) the set shuts down.

7.3.07 Return the first power supply voltage to 10 volts and reduce the second supply voltage, observe that the low battery indicator comes on at 9.68 volts and that the set shuts down at 9.54 volts.

7.3.08 The voltage at which low battery indications and shutdown occur should be accurate to within 0.1 volts. The differential between low battery indication and shutdown voltage for either supply should be 0.16 volts ±.02 volts.

7.3.09 An alternative procedure is possible which avoids disconnecting the batteries. Operate the set on battery power until the batteries are discharged and the set shuts down. Measure the voltage of the two batteries and monitor the voltage of whichever is smaller. With the PULL ON switch on, apply ac line voltage to the set and turn the ac line switch on. Observe that as the batteries charge, the display first comes on with low battery indication and then the low battery indicator goes off. As soon as the low battery indicator goes off turn off the ac line switch. The batteries will now begin to discharge into the operating circuits of the set. Observe the battery voltage and note its value when the low battery indicator comes on and when the set shuts off.

7.4 Preliminary Generator Check

7.4.01 A rough operating check of the SEND section is made next to assure that it is basically functioning and can be used to test the receive section.

1. Turn the set on.
2. Place the display switch in SEND/HZ.
3. Observe that the digital frequency display operates and that the frequency reading can be tuned through each of the four frequency ranges, and to each of the three fixed frequencies.
4. Press the RCV I/SEND II LINE SELECT button.
5. Connect an oscilloscope to the LINE II output terminals.
6. Observe that the output waveform appears sinusoidal and that its amplitude responds to changes in the SEND LEVEL switch positions and VERNIER setting.

7.5 Receive Level Adjustment

7.5.01 Set the front panel control and switches as follows:

METER RESPONSE	NORMAL
DISPLAY	SEND HZ
IMPULSE COUNT, MINUTES	CONT
SEND LEVEL switches	0;0 dBm
SEND LEVEL VERNIER	center
SEND IMPEDANCE	900
frequency	FIXED 1010 Hz (or 810 Hz)
receive CKT IMPEDANCE	600
MEASUREMENT LEVEL switches	0;0 dBm
TERM/BRDG	TERM
1010 Hz (810 Hz) NOTCH	OUT
WEIGHTING	FULL RANGE
LINE SELECT	RCV I SEND II
DIAL & HOLD	out
METER RANGE	-3 to +3
PULL ON	ON
AC LINE	ON

7.5.02 This is the normal setting for switches used in all subsequent tests unless otherwise specified.

7.5.03 Make the following connections:

1. Line II terminals (send) through a precision 600 ohm resistance to Line I terminals (receive).
2. Precision ac voltmeter across the LINE II (send) terminals.

NOTE 1: To avoid errors due to hook-up lead resistance, the precision resistor should be located at the LINE I terminals, and the ac voltmeter should be connected as close to the resistor as possible.

NOTE 2: For a balanced input signal, the precision resistor would be split, 300 ohms in each side of the line. However, most ac voltmeters used in calibration are single ended. Therefore, calibration is normally performed with the precision resistor in series with one side of the line and the other side grounded.

NOTE 3: Calibration accuracy in all cases (except N-G or a,b to gnd) is specified in terms of input power, not voltage. (For bridging measurements, this is power into an external termination.) This is the reason for monitoring input voltage ahead of a precision series resistor. The measured voltage should be precisely twice the calculated voltage for a specified level. Thus 0 dBm, 600 ohm is .7746 volts, and the ac voltmeter reading ahead of the series resistance for this level is 1.5492 volts.

7.5.04 Adjust the SEND level so that the precision ac voltmeter reads 1.5492 volts.

7.5.05 In the meter printed circuit assembly, A7, which is mounted on the back of the meter, turn the transmission cal adjust pot, R5, so that the meter reads 0.

7.5.06 Turn the WEIGHTING switch to the 15 k FLAT (30 Hz - 16 kHz) position. Adjust the noise cal adjust pot, R1, so that the meter again reads 0. Return the WEIGHTING switch to the FULL RANGE position.

7.5.07 Reduce the send level 3 dB so that the ac voltmeter reads 1.0955 volts. Turn the scale adjust trimpot R9 so that the meter reads -3.

7.5.08 Check the scale adjustment by increasing the send level so that the ac voltmeter reads 2.191 volts, and observe a meter reading of +3. If necessary due to meter non-linearity, the scale adjust may be set to the best compromise at -3 and +3.

7.6 Preamp & Weighting Adjustments

7.6.01 Turn both the SEND IMPEDANCE and receive CKT IMPEDANCE switches to 135 (150) ohms and replace the 600 ohm resistor between the LINE II and LINE I terminals with a 135 ohm (150 ohm) resistor.

7.6.02 Adjust the SEND LEVEL for an ac voltmeter reading of 0.735 volts (0.775 volts for 150 ohms). The meter should read 0.

7.6.03 Observe the meter reading as SEND frequency is tuned over the range from 200 kilohertz to its maximum limit while maintaining the ac voltmeter reading with the SEND LEVEL adjust. Turn the high frequency adjust pot, R6, on the preamp and weighting assembly A3 for the best compromise setting over this range. Normally there will be a slight peak at about 250 kilohertz and the response should be dropping off at 300 kilohertz. Return all switches to their normal positions and restore the precision resistor to the 600 ohm value.

7.6.04 Turn the WEIGHTING switch to the C-MSG (or TEL CKT) position. Tune the SEND oscillator to precisely 1000 Hz for the T194C or 800 Hz for the T194CE. With the SEND LEVEL set so that the ac voltmeter reads 1.5492 volts, adjust the C-MSG (or TEL CKT) gain adjust, pot R33 (or R38) so that the meter reads 0.

7.6.05 Turn the WEIGHTING switch to the PROGRAM position. For this adjustments the frequency should be 1000 Hz for either T194C or T194CE and the precision ac voltmeter reading should be 1.5492 volts. Set the PROGRAM gain adjust pot, R50 (or R52) so that the meter reads 0.

7.6.06 To adjust the notch filter, turn the WEIGHTING switch to the 3 k FLAT (30 Hz to 30 kHz) position. Move the 1010 Hz (810 Hz) NOTCH switch to the IN position. Proceed as follows:

1. With the frequency set to 1025 Hz (822 Hz in the case of the 810 Hz Notch). Adjust the high frequency tuning pot, R81, for the lowest possible measurement level reading.

2. With the frequency at 995 Hz (798 Hz) turn the low frequency adjust pot, R88, to the lowest possible measurement level reading.

3. With the frequency at 1010 Hz (810 Hz) turn the mid frequency adjustment, R75, to the lowest possible level meter reading.

4. Vary the SEND frequency through the notch range and observe that the notch filter specifications are met. Return all switches to the normal positions.

7.7 Impulse Count Adjust

7.7.01 Turn the display switch to the IMPULSE COUNT position. Adjust the signal level for a reading of -3 on the meter scale. NOTE: It is the meter scale reading, not the total measurement reading including the switch settings, that is important for this adjustment.

7.7.02 On the meter circuit assembly, A7, Turn the threshold adjust calibration, R30, so that the display just begins to register counts. Raising the threshold very slightly should stop the count; lowering it slightly should cause a continuous count.

7.7.03 With the signal set for an on-scale meter reading observe that the impulse count reading is incrementing at a steady rate. Set the dead time adjust, R35, so that this rate is 8 counts per second or 12½ seconds for 100 counts. Return all switches to their normal positions.

7.8 Oscillator Calibration

7.8.01 Since the receive circuit calibration of the T194C/CE has been completed, the receive section can be used for calibrating the send section. Place all switches in the standard position as shown in 7.5.01. Use a patch cord to directly connect the LINE I and LINE II terminals. No series resistance is used. Calibration is done with both send and receive impedances at 600 ohms.

7.8.02 Be sure that the MEASUREMENT LEVEL and SEND LEVEL switches are set to 0 dBm and that the SEND LEVEL VERNIER control is in its center position. In the oscillator assembly, A6, turn the LEVEL ADJUSTMENT pot, R30, so that the MEASUREMENT LEVEL meter reads 0.

7.8.03 With the FREQUENCY switch in the FIXED 404 Hz position adjust trimpot R19 for a frequency display reading of 404 Hz.

7.8.04 With the FREQUENCY switch in the FIXED 1010 (810 Hz) position adjust trimpot R17 for a display reading of 1010 (810) Hz. NOTE: The 10 Hz or approximately 1% offset is chosen to assure that under no condition of drift will the frequency drop to 1000 or 800 Hz. These frequencies are to be avoided because they are submultiplies of the sampling rate in PCM transmission systems. A 4 Hz offset is standard for crystal controlled oscillators and a 10 Hz offset for analog oscillators.

7.8.05 With the FREQUENCY switch in the FIXED 2800 (2400) Hz position, adjust R15 for a frequency display reading of 2800 (2400) Hz.

7.9 Send Amplifier

7.9.01 Turn the SEND LEVEL switch to the OFF position. Use a dc voltmeter on a low voltage scale to observe the dc voltage across the primary of output transformer A11T2 (brown and brown/white transformer leads accessible at the back of the 6 pin transformer lead connector). On the send amplifier, A5 adjust the offset null pot, R34 to null this voltage. Turn the SEND LEVEL back to 0 dBm level.

7.9.02 Set the SEND LEVEL to 0.0 dBm as observed through the patch cord connection by the MEASUREMENT LEVEL section of the T194C/CE. Turn the RECEIVE CKT IMPEDANCE switch to the CAL SEND position. In the send amplifier, turn the CAL SEND adjustment R21 so that the meter reads 0.0. NOTE: The CAL SEND ADJ signal is taken from a point in the send amplifier ahead of the output impedance circuits. Turning to the CAL SEND position disables receive measurement but does not disable sending. The voltage at the send terminals may vary depending on the impedance connected to them without any change in the CAL SEND meter reading. However, the output level, which is defined as the power which would be delivered to a terminating impedance equal to the selected nominal send impedance, does not change when the actual load impedance changes.

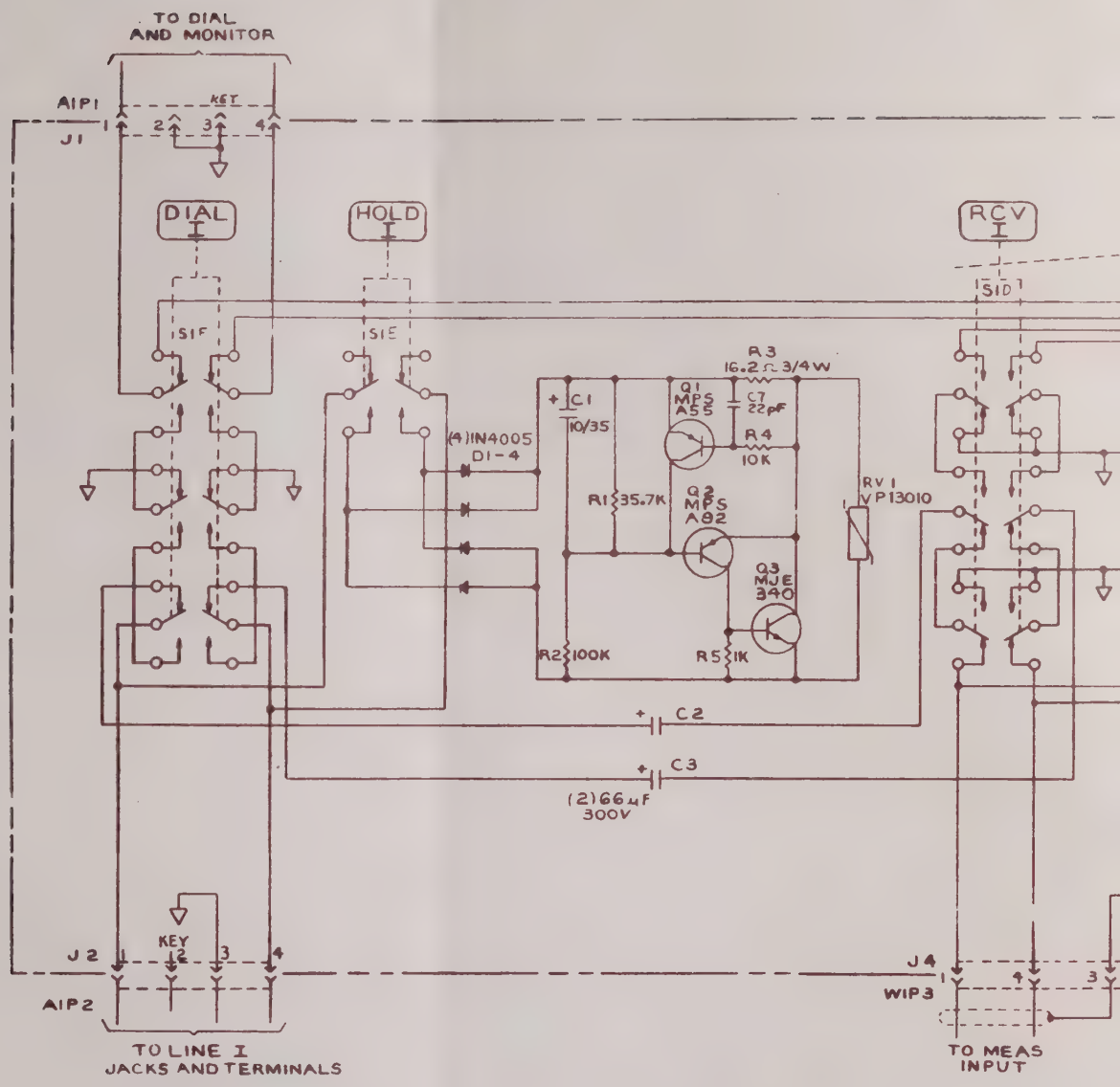
8.0 SCHEMATIC AND LAYOUT DRAWINGS AND ILLUSTRATIONS

8.1 General

8.1.01 The following pages provide the illustrations useful in locating and identifying the various assemblies that make up the Model T194C (T194CE) Transmission and Noise Test Set.

8.1.02 The necessary schematic diagrams and layout drawings of each sub-assembly are given to allow identification of various components, controls and terminals on the circuit boards. This information will be useful to those with the facilities to provide maintenance and calibration of this test equipment.

NOTE: Refer to the "Contents" for separate lists of Drawings and Illustrations - one for the T194C and one for the T194CE.



UNLESS NOTE
3 PLACE VALU

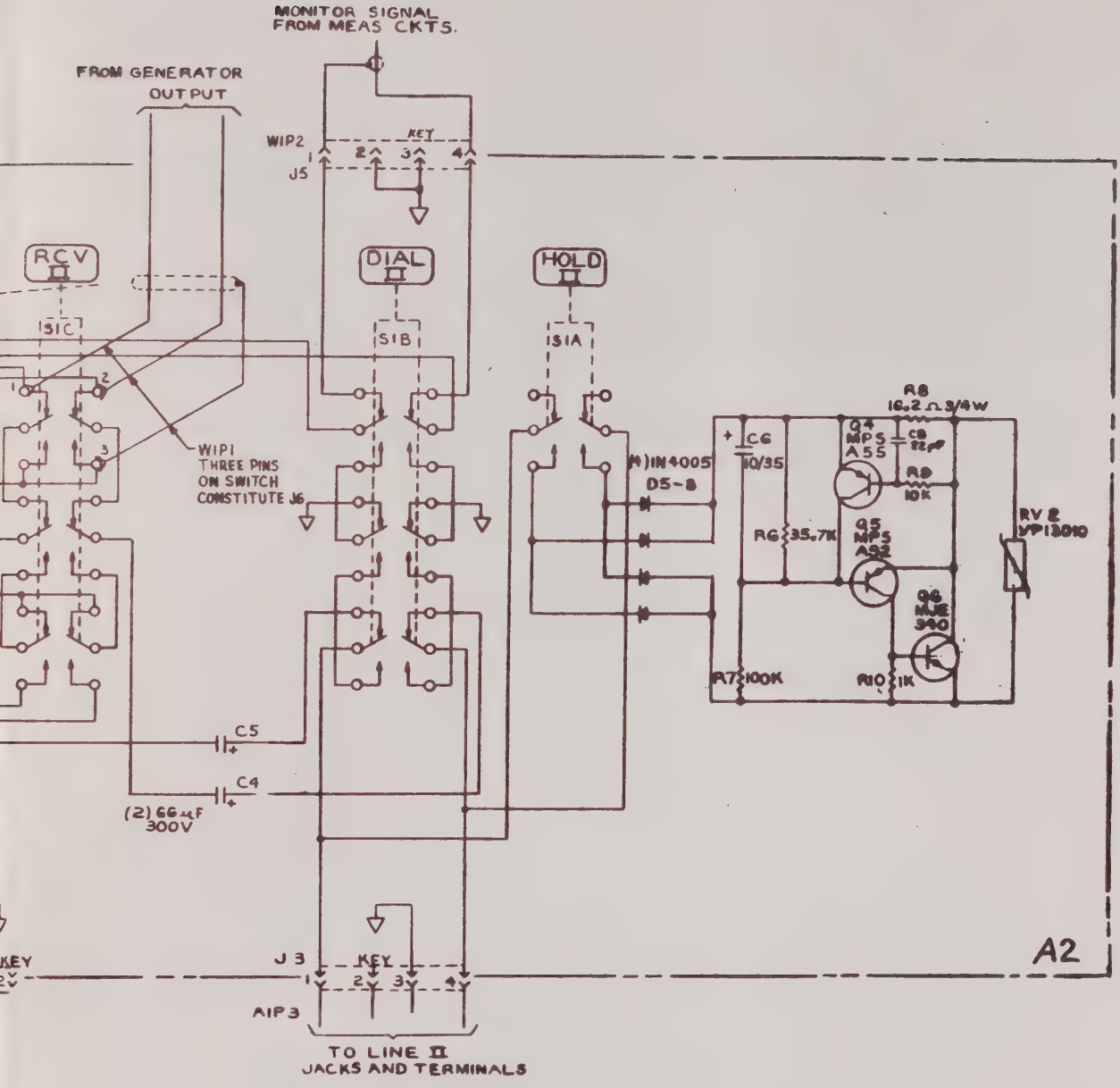


FIGURE 8-1

Hold and Line Switching Schematic A2

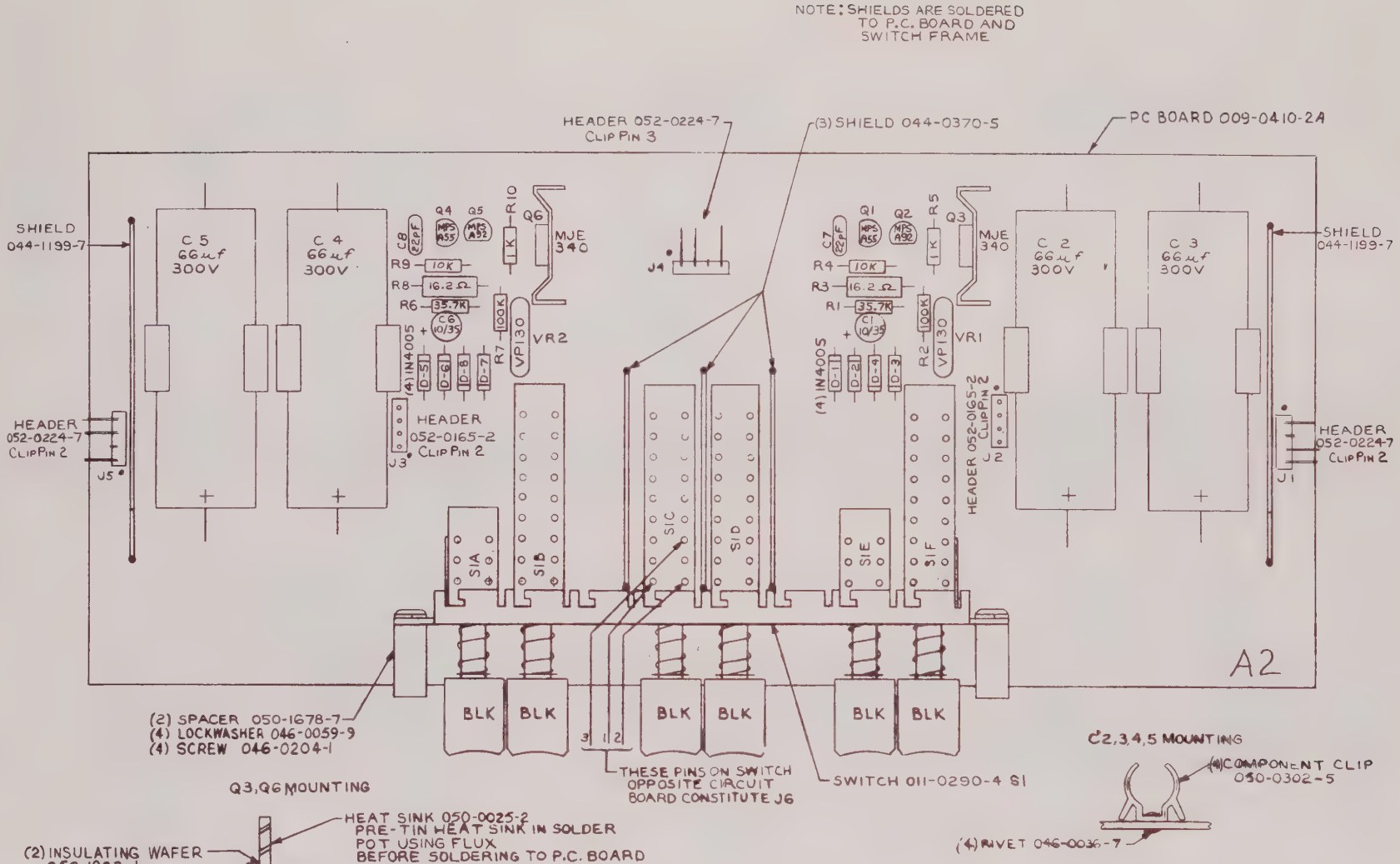
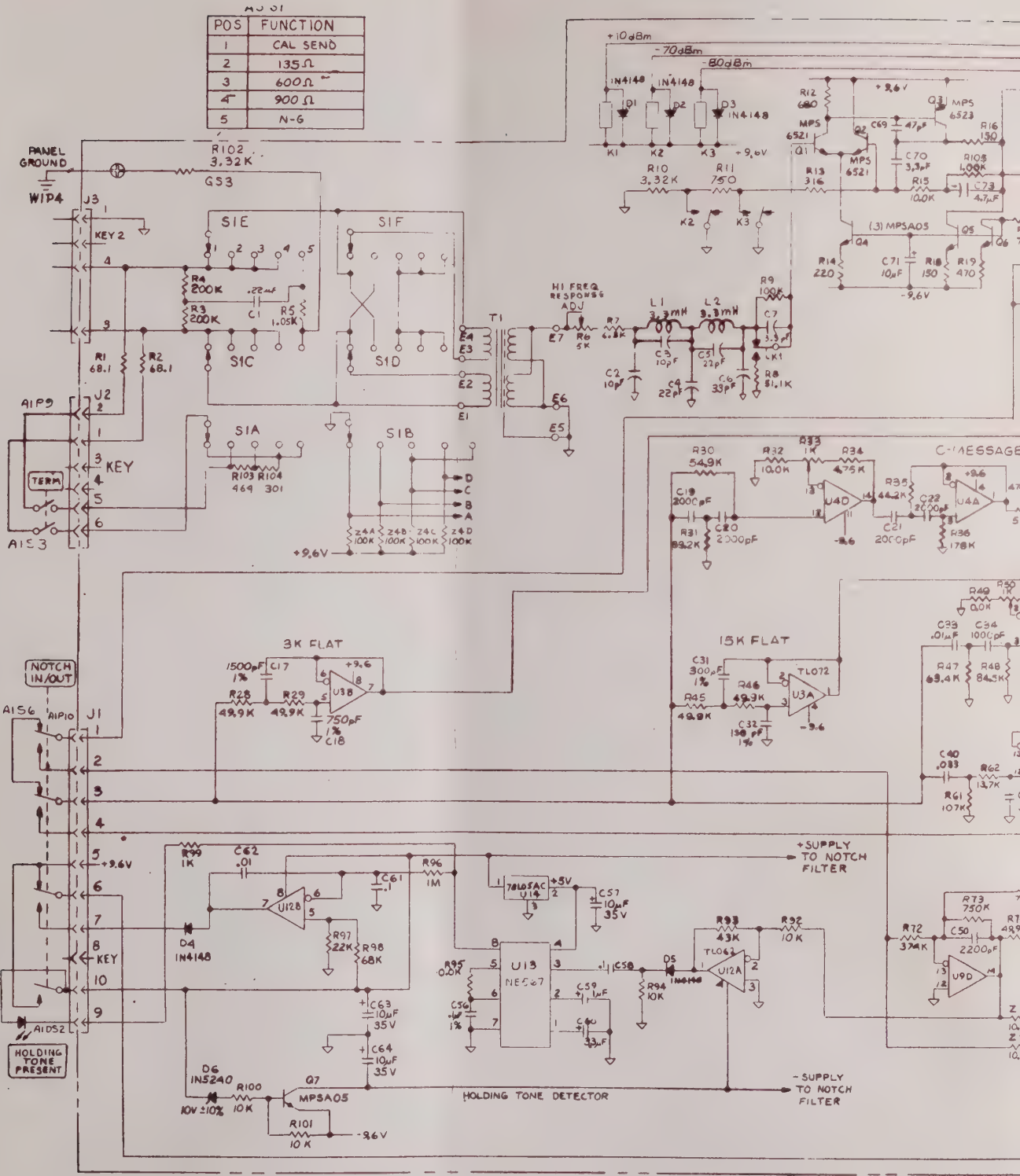
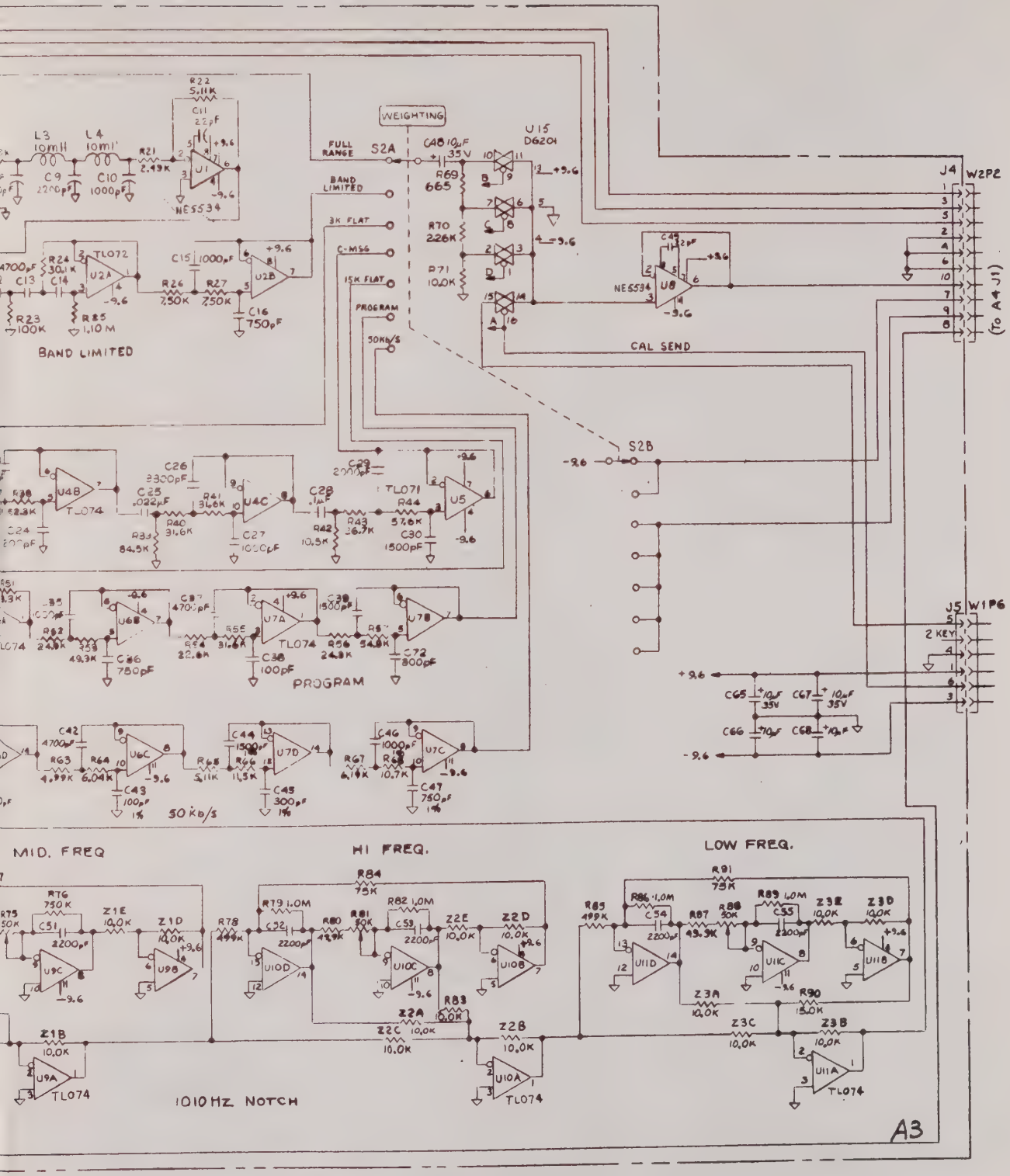


FIGURE 8-2
Hold and Line Switching
P.C. Assembly A2



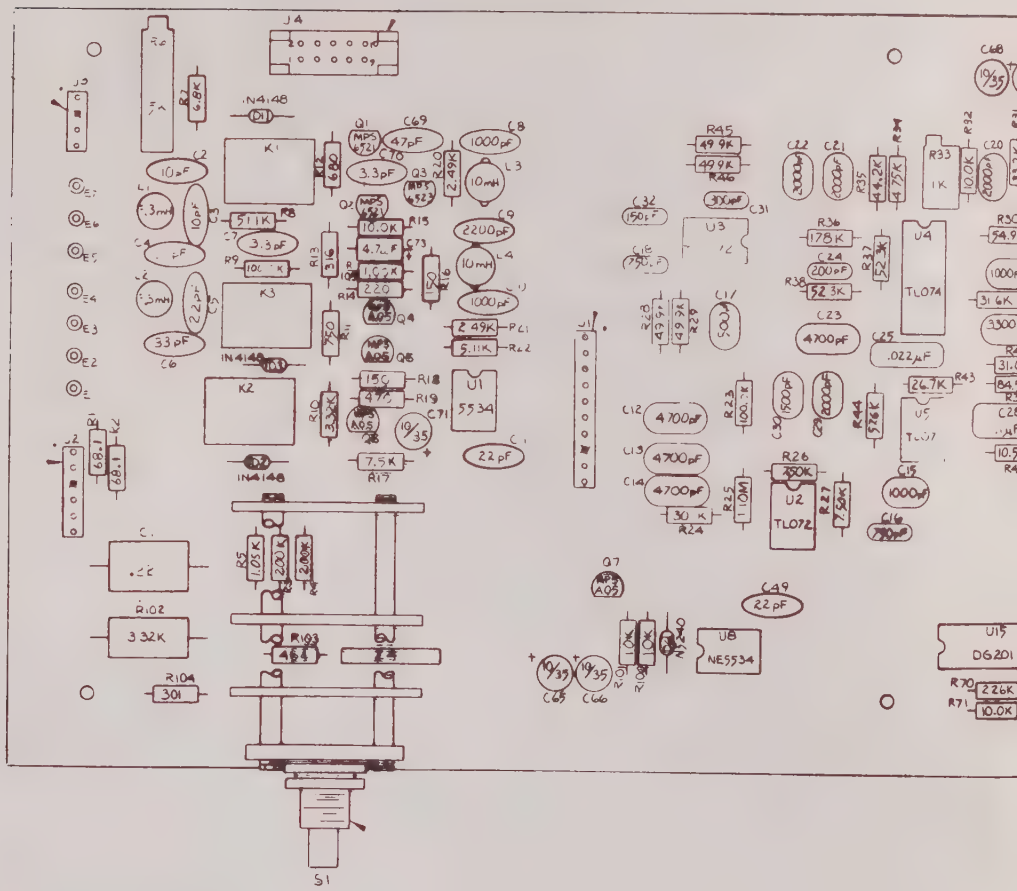
R58-R60 NOT USED



HIGHEST COMPONENT REFERENCE DESIGNATION		
R105	U15	Q7
C73	D6	L4

UNLESS NOTED, RESISTORS 1/4W
3 PLACE VALUES ±1% OTHERS ±5%

FIGURE 8-3
Preamplifier and Weighting
Schematic A3


HEADER 052-0031-6
CLIP PIN 8
HEADER 052-0214-8
J4
J3
J2
J1
K1
K2
K3
S1
U1
5534
U2
TL072
U3
U4
TL074
U5
TL071
U8
NE5534
U15
DG201
IN4148
IN4148
IN4148
Q1
Q2
Q3
Q4
Q5
Q7
C1
C2
C3
C4
C5
C6
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22
C23
C24
C25
C26
C27
C28
C29
C30
C31
C32
C65
C66
C68
C69
C70
C71
C73
L1
L2
L3
L4
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
R39
R40
R41
R42
R43
R44
R45
R46
R70
R71
R102
R103
R104
68.1
68.1
6.8K
511K
10.0K
3.16
100
750
2.49K
5.11K
150
47
7.5K
3.32K
1.05K
200
2.00K
4.84
332K
301
47pF
3.3pF
10pF
3.3pF
10pF
.1µF
33pF
22pF
1000pF
10mH
2200pF
10mH
1000pF
2.49K
5.11K
22pF
4700pF
4700pF
4700pF
30
1.10M
750K
1000pF
750pF
22pF
10K
10K
10K
49.9K
49.9K
49.9K
49.9K
178K
52.3K
200pF
52.3K
4700pF
.022µF
100K
100K
4.75K
44.2K
10.0K
1K
24.7K
576K
2.26K
10.0K
* - SWITCH 011-0286-24

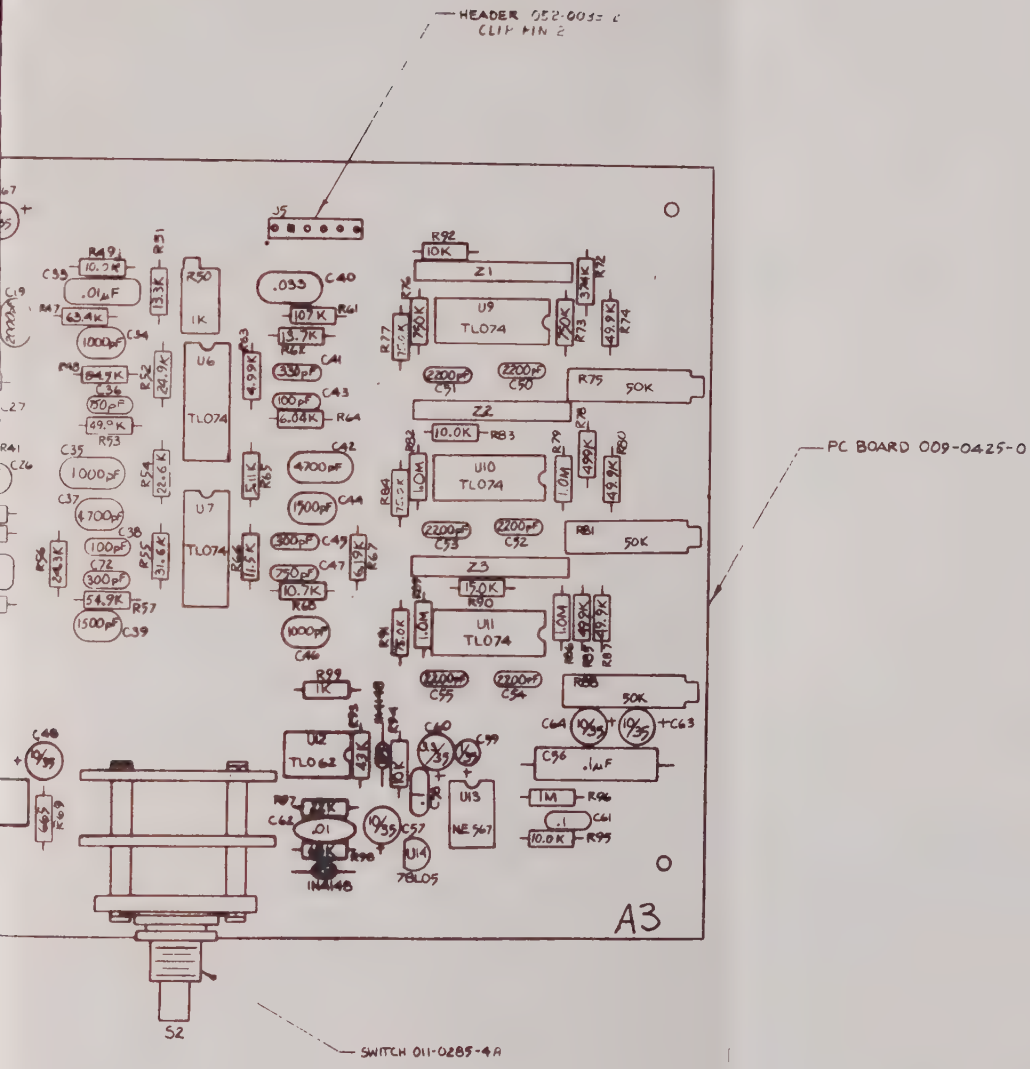
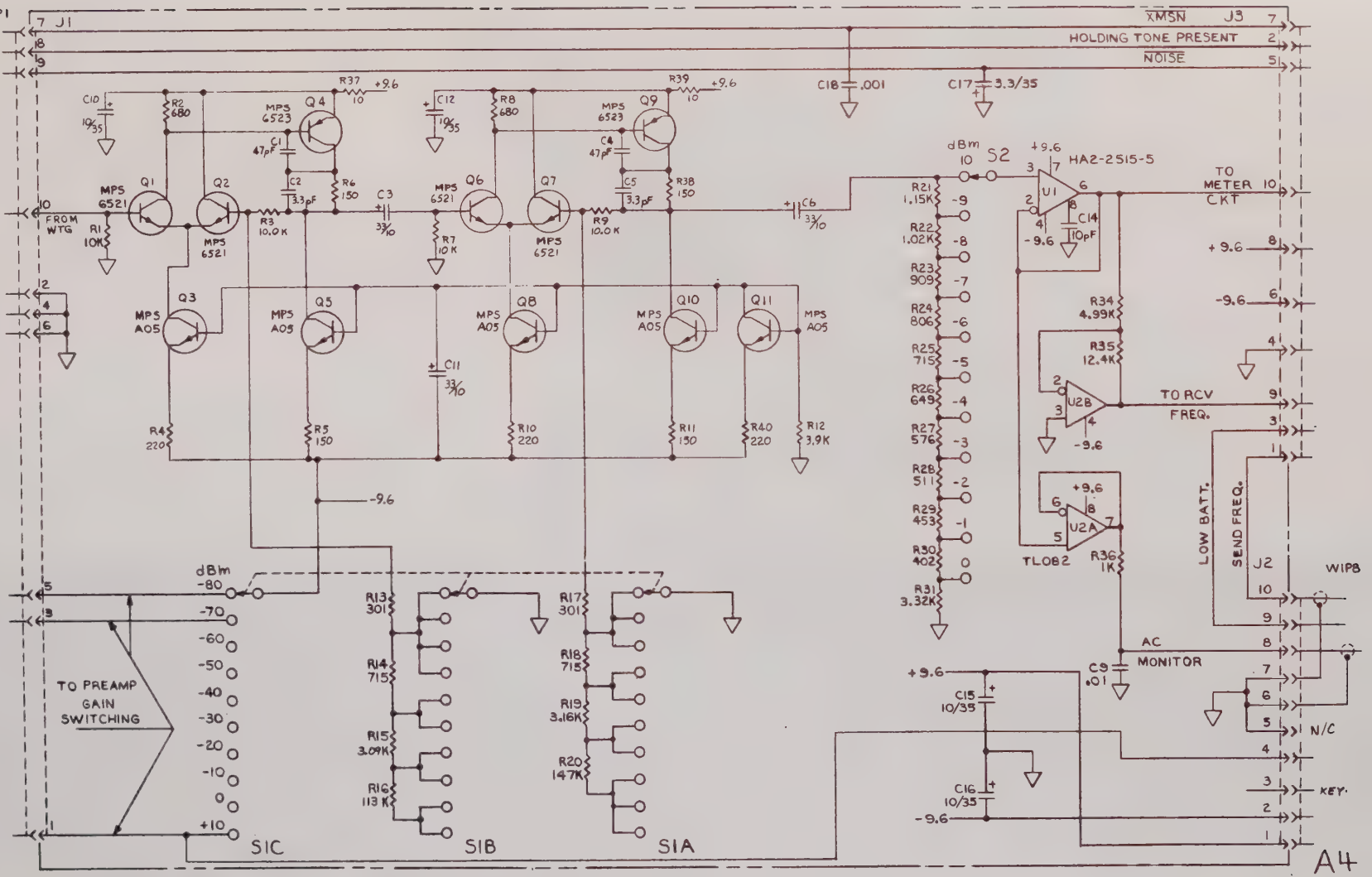


FIGURE 8-4
Preamplifier and Weighting
P.C. Assembly A3



HIGHEST COMPONENT REFERENCE DESIGNATION		
R40	C18	Q11

C7, C8, C13 NOT USED

UNLESS NOTED, RESISTORS 1/4W
3 PLACE VALUES ±1% OTHERS ±5%

FIGURE 8-5
Measurement Level Switching
Schematic A4

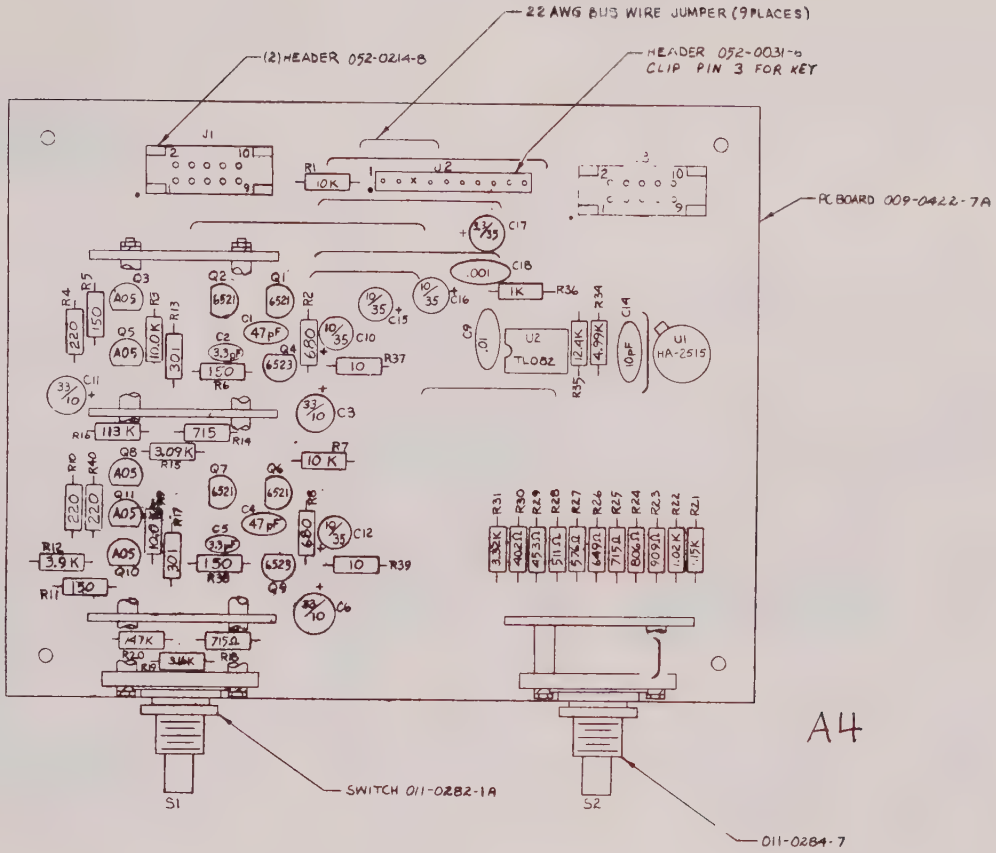
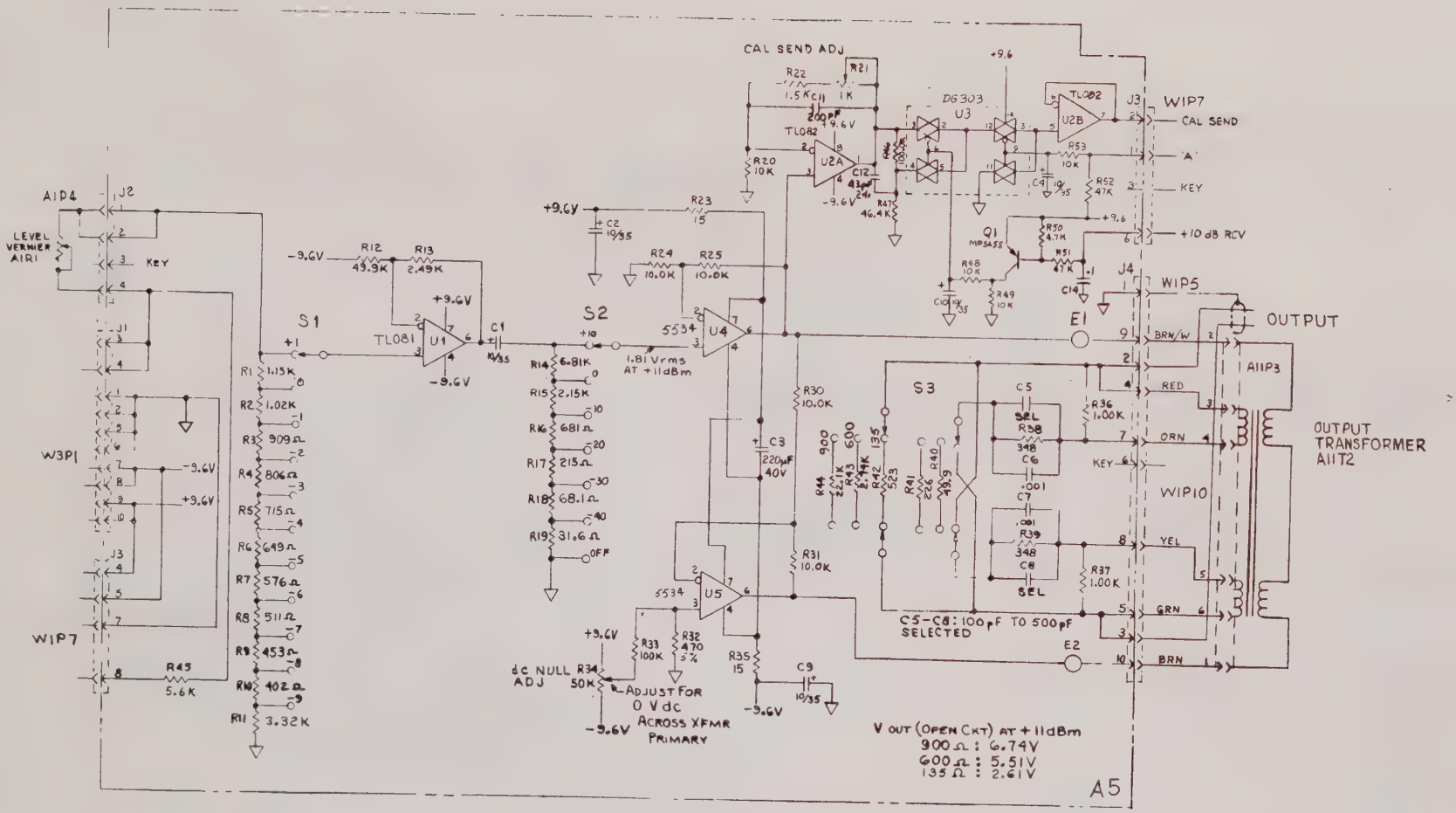


FIGURE 8-6
Measurement Level Switching
P.C. Assembly A4



HIGHEST COMPONENT REFERENCE DESIGNATION		
R53	U5	
C14	Q1	

R26, 27, 28, 29 NOT USED
C13 NOT USED

UNLESS NOTED, RESISTORS 1/4W
3 PLACE VALUES ±1% OTHERS ±5%

FIGURE 8-7
Send Amplifier
Schematic A5

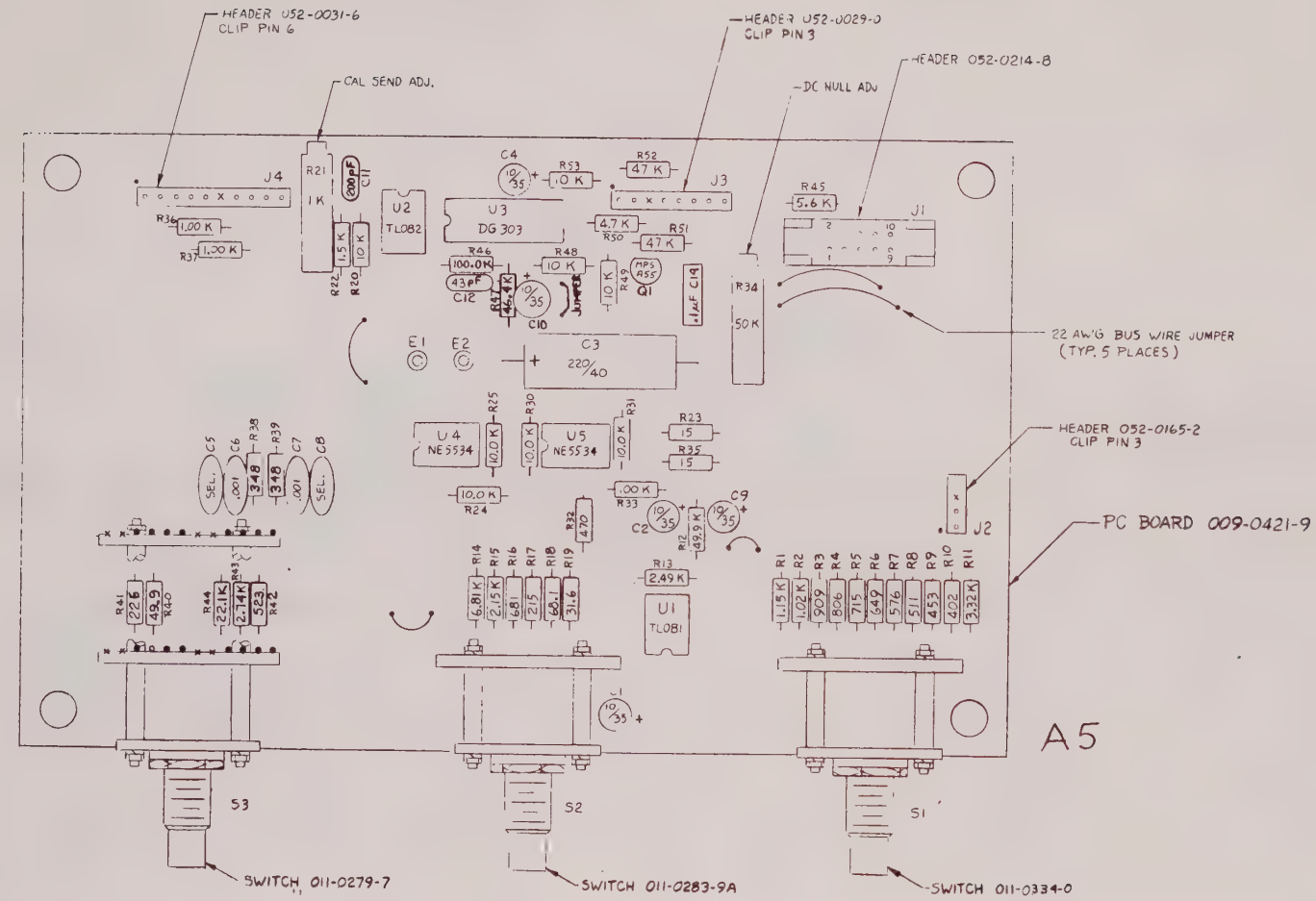
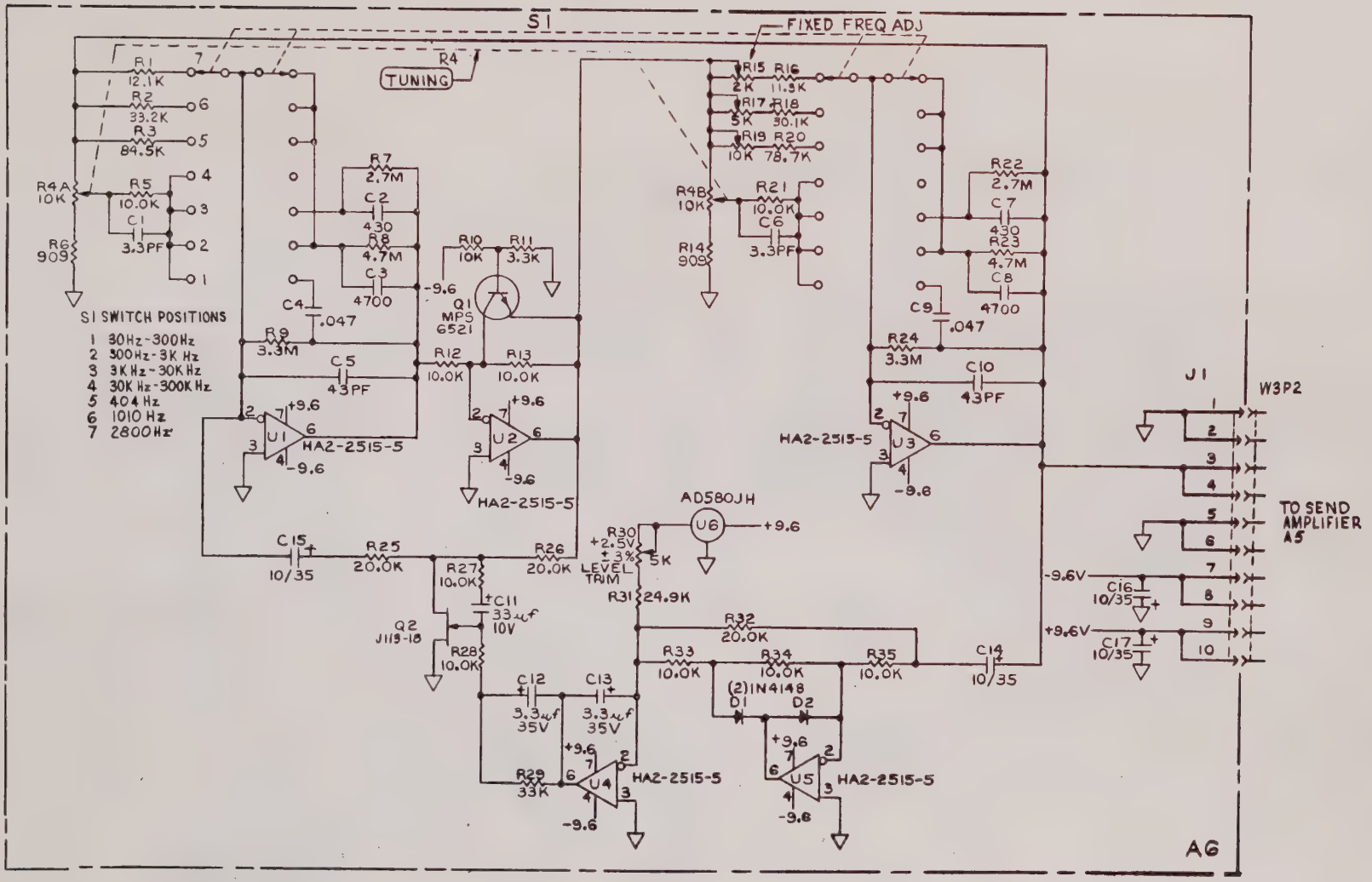


FIGURE 8-8
Send Amplifier
P.C. Assembly A5



UNLESS NOTED, RESISTORS 1/4W
3 PLACE VALUES ±1% OTHERS ±5%

FIGURE 8-9
Oscillator
Schematic A6

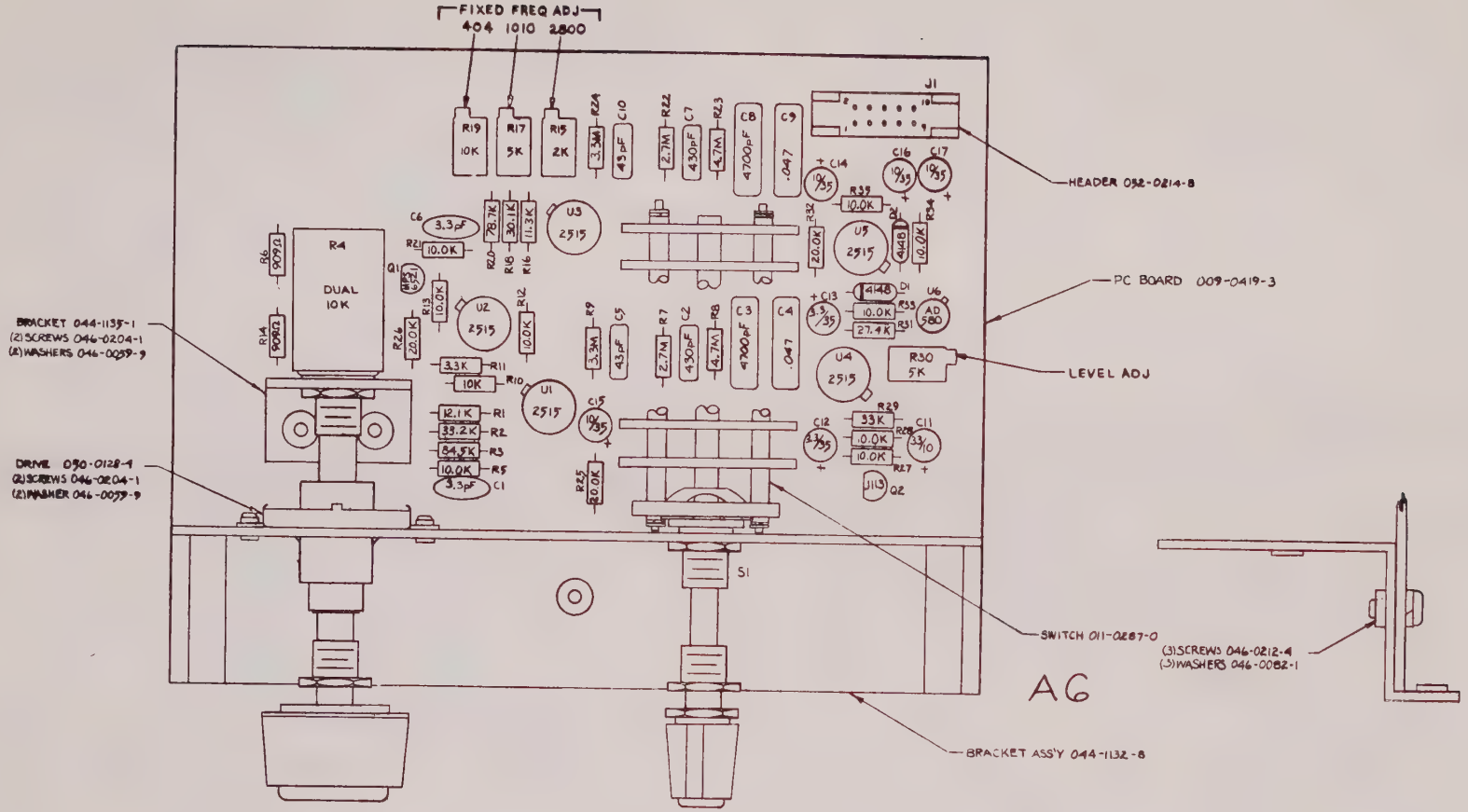
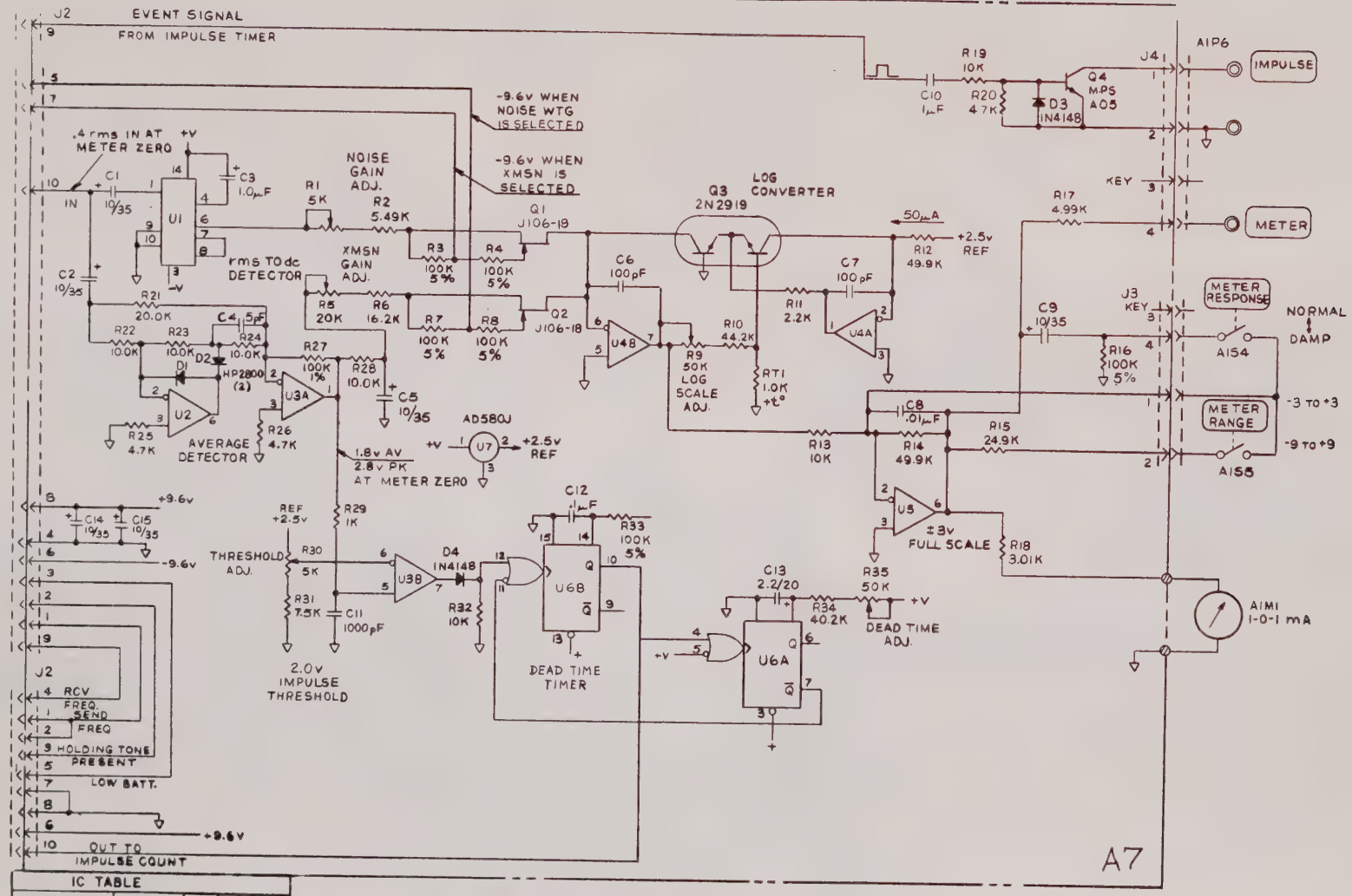


FIGURE 8-10
Oscillator
P.C. Assembly A6



IC TABLE				
REF. DES.	TYPE	+V	-V	GND
U1	AD536J	PIN 14	PIN 8	PIN 8
U2	NE5534	PIN 7	PIN 4	
U3, U4	TL072	PIN 8	PIN 4	
U5	TL081	PIN 7	PIN 4	
U6	4598	PIN 16		PIN 8

HIGHEST COMPONENT REFERENCE DESIGNATION		
C15	Q4	D4
R35	U7	

UNLESS NOTED, RESISTORS 1/4W
3 PLACE VALUES ±1% OTHERS ±5%

FIGURE 8-11
Meter Circuit
Schematic A7

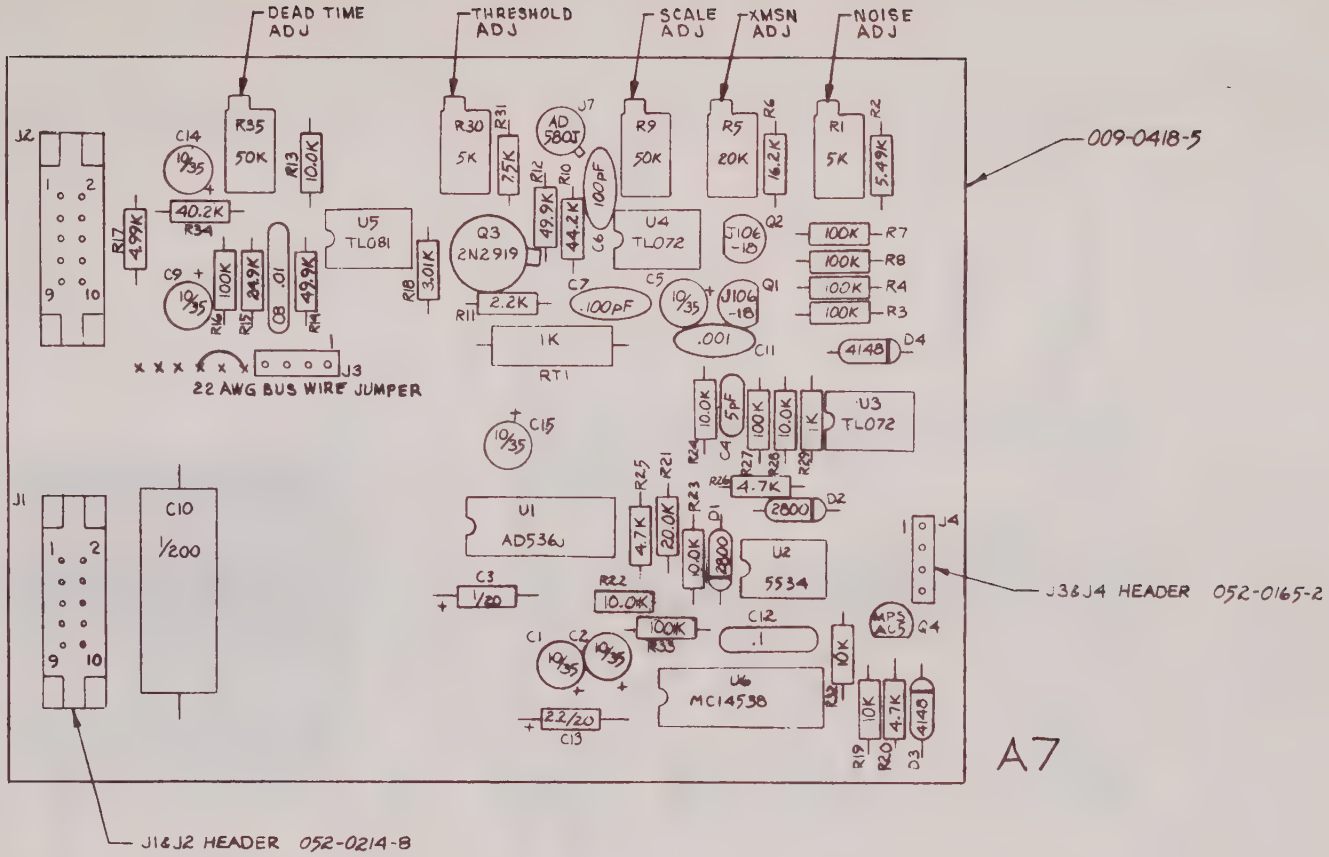
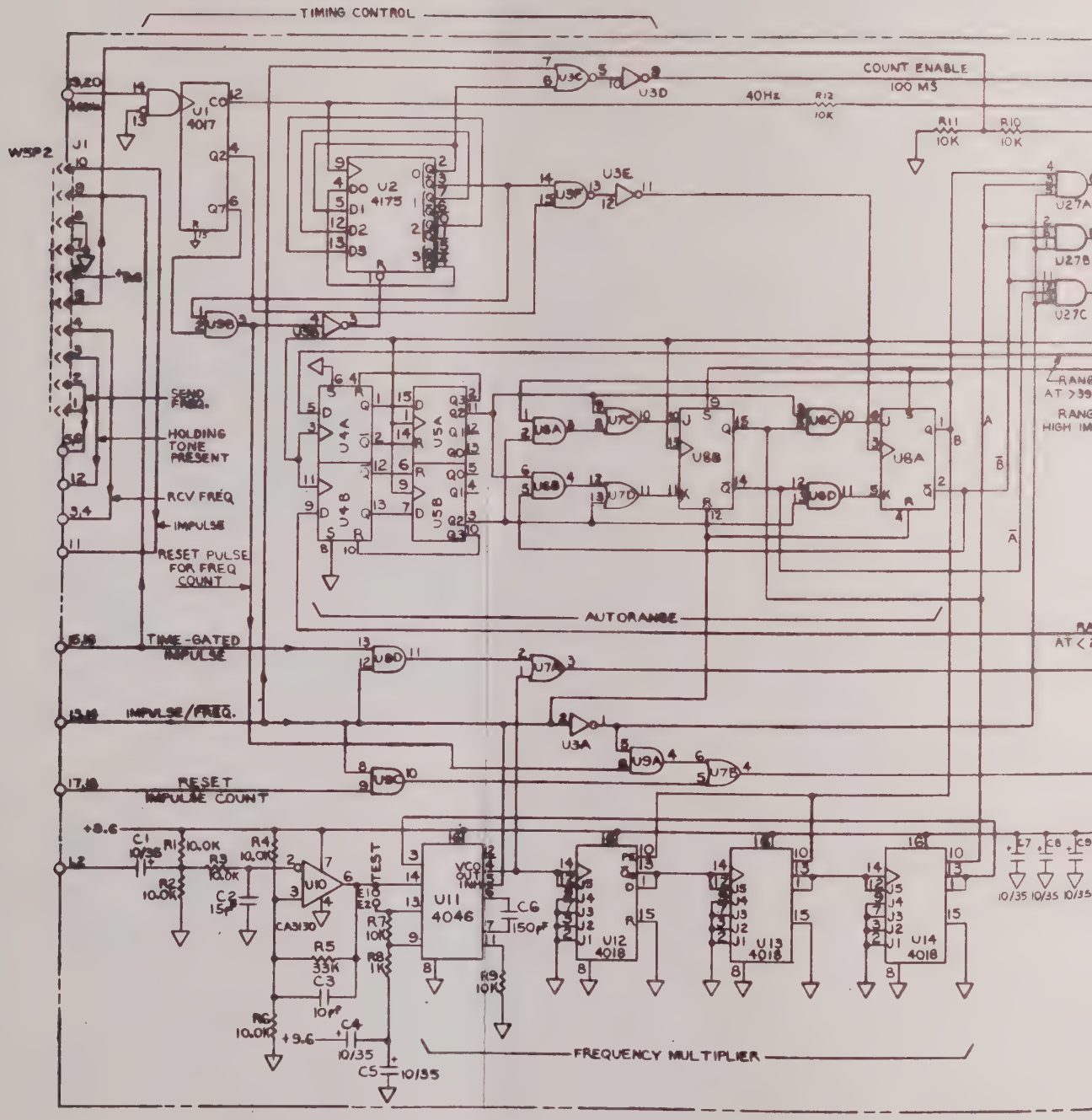
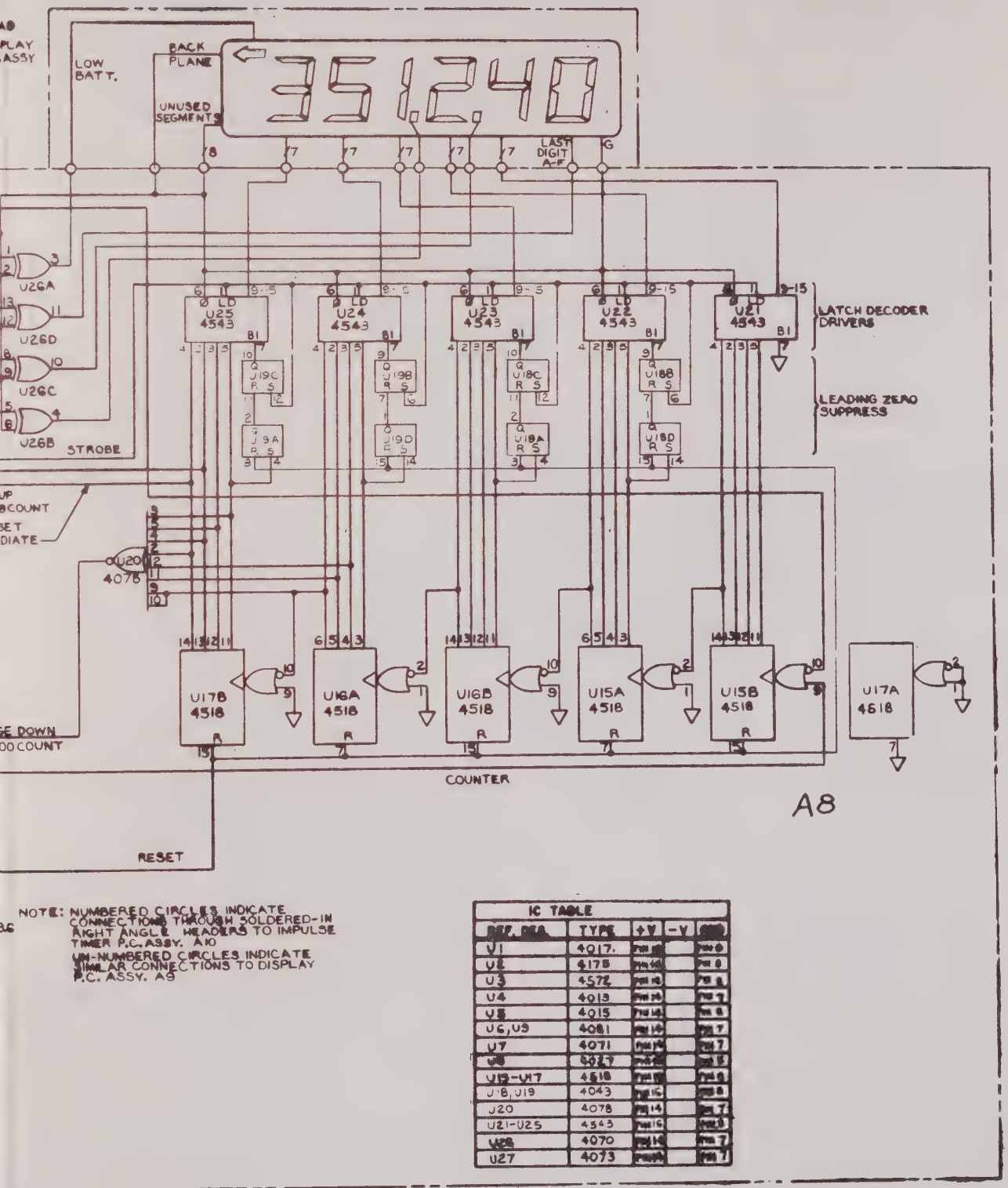


FIGURE 8-12
Meter Circuit
P.C. Assembly A7


TIMING CONTROL
COUNT ENABLE
100 MS
40Hz
R12
10K
R11
10K
R10
10K
U1
4017
U2
4175
U3C
U3D
U3E
U3F
U27A
U27B
U27C
W3P2
J1
SEND FREQ.
HOLDING TONE PRESENT
RCV FREQ
IMPULSE
RESET PULSE FOR FREQ COUNT
TIME-GATED IMPULSE
IMPULSE/FREQ.
RESET IMPULSE COUNT
AUTORANGE
U4A
U4B
U5A
U5B
U6A
U6B
U6C
U6D
U7A
U7B
U7C
U7D
U8A
U8B
U8C
U8D
U9A
U9B
U9C
U3A
U10
CA3130
U11
4046
U12
4018
U13
4018
U14
4018
C1
10/35
C2
15pF
C3
10pF
C4
10/35
C5
10/35
C6
150pF
C7
10/35
C8
10/35
C9
10/35
R1
10.0K
R2
10.0K
R3
10.0K
R4
10.0K
R5
33K
R6
10.0K
R7
10K
R8
1K
R9
10K
+9.6
+8.6
FREQUENCY MULTIPLIER



NOTE: NUMBERED CIRCLES INDICATE CONNECTIONS THROUGH SOLDERED-IN RIGHT ANGLE HEADERS TO IMPULSE TIMER P.C. ASSY. A10
UN-NUMBERED CIRCLES INDICATE SIMILAR CONNECTIONS TO DISPLAY P.C. ASSY. A9

IC TABLE

REF. DES.	TYPE	+V	-V	GND
U1	4017			
U2	4175			
U3	4572			
U4	4013			
U5	4015			
U6, U9	4081			
U7	4071			
U8	4027			
U10-U14	4518			
U18, U19	4043			
U20	4078			
U21-U25	4543			
U26	4070			
U27	4073			

UNLESS NOTED, RESISTORS 1/4W
3 PLACE VALUES ±1% OTHERS ±5%

FIGURE 8-13
Frequency Meter
Schematic A8

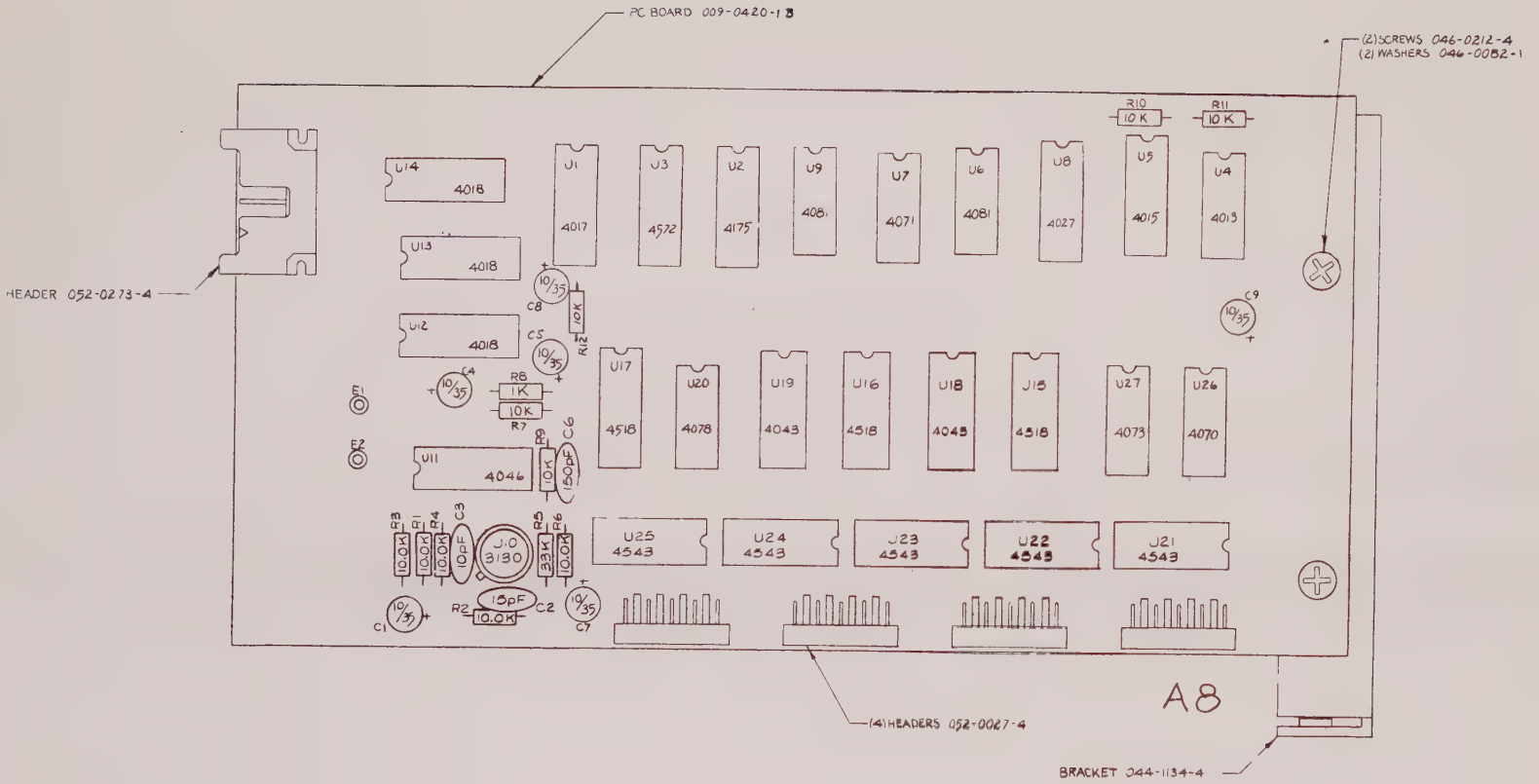


FIGURE 8-14
Frequency Meter
P,C, Assembly A8

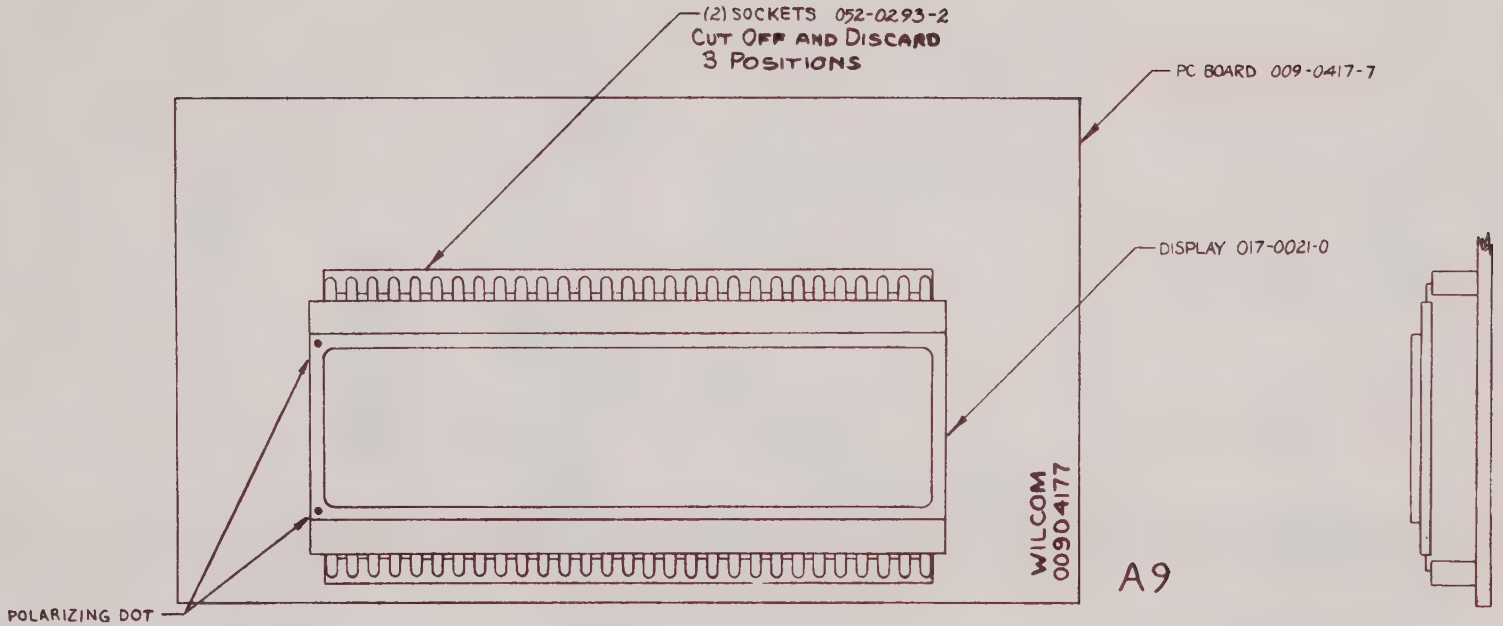
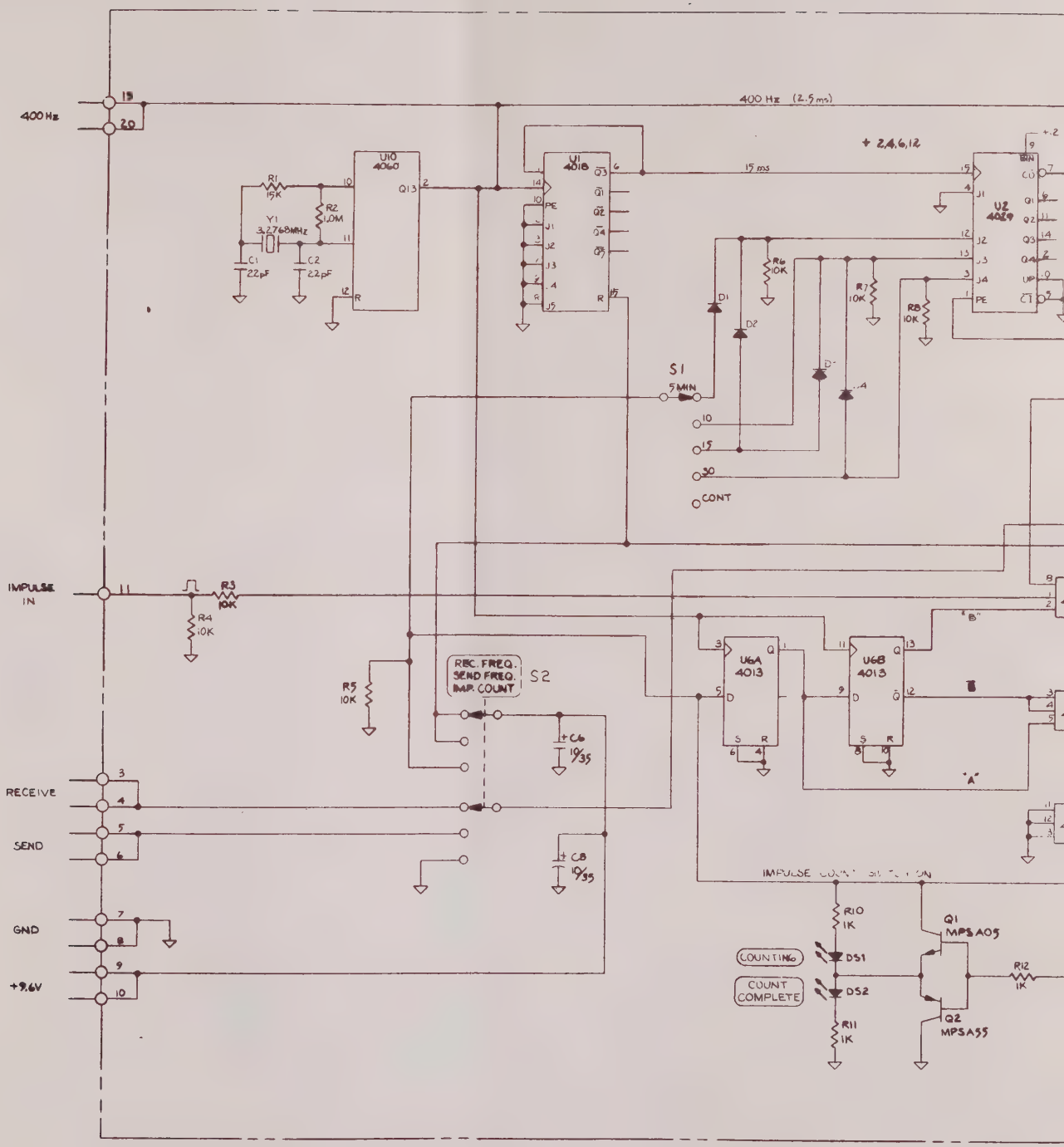
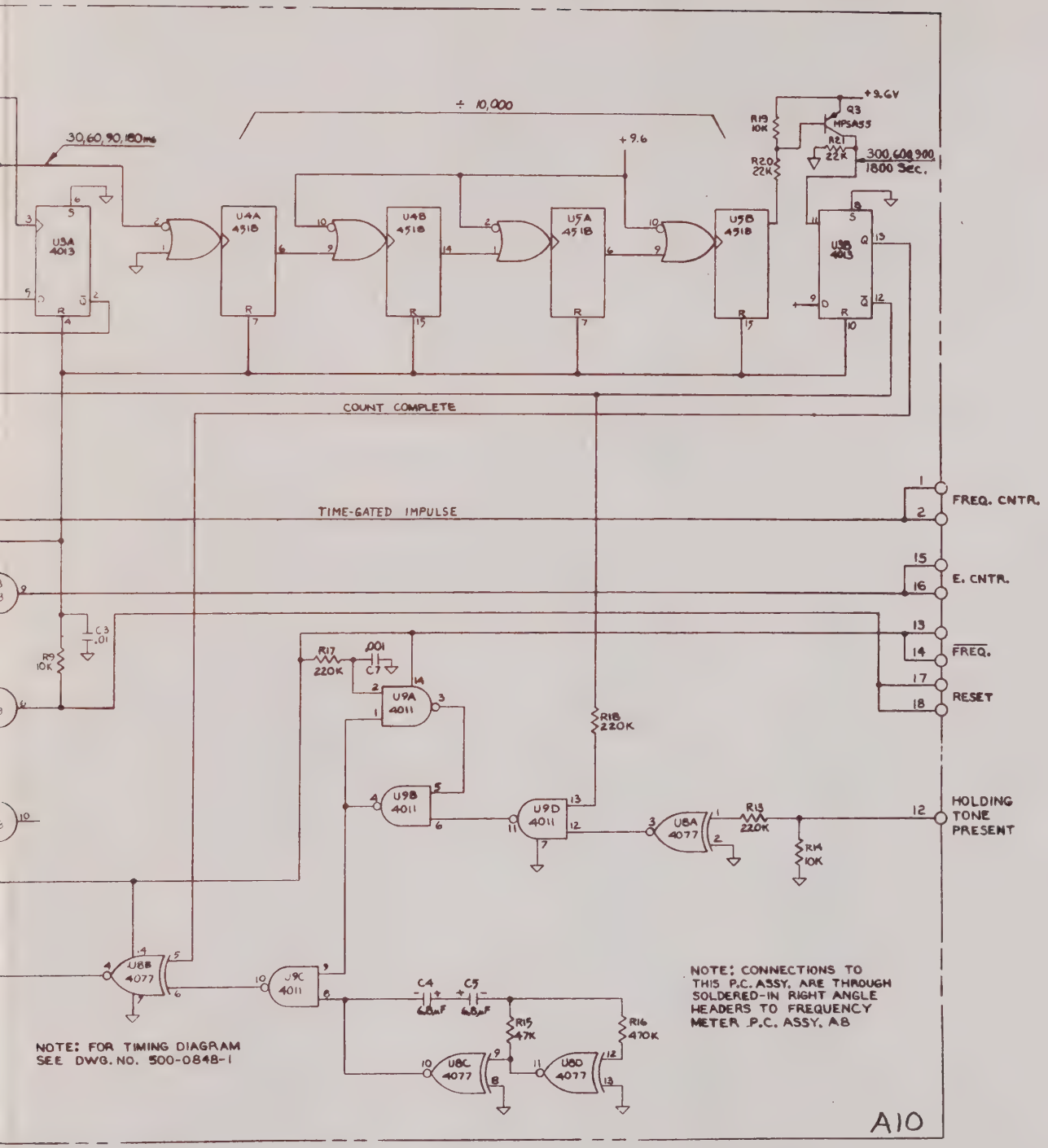


FIGURE 8-15
Readout
P,C, Assembly A9


400 Hz
400 Hz (2.5 ms)
+ 2,4,6,12
15 ms
U10 4060
U1 4018
U2 4029
R1 15K
R2 1.0M
Y1 3.2768MHz
C1 22pF
C2 22pF
R6 10K
R7 10K
R8 10K
D1
D2
S1
5 MIN
10
15
30
CONT
IMPULSE IN
R3 10K
R4 10K
R5 10K
REC. FREQ.
SEND FREQ.
IMP. COUNT
S2
+ C6 10/35
+ C8 10/35
U6A 4013
U6B 4013
"B"
"A"
RECEIVE
SEND
GND
+9.6V
IMPULSE COUNT SELECTION
R10 1K
Q1 MPSA05
COUNTING
DS1
COUNT COMPLETE
DS2
R11 1K
R12 1K
Q2 MPSA55



HIGHEST COMPONENT REFERENCE DESIGNATION		
C8	D4	DS2
Q3	R21	U10
Y1		

UNLESS NOTED, RESISTORS 1/4W
3 PLACE VALUES ±1% OTHERS ±5%

FIGURE 8-16
Impulse Timer
Schematic A10

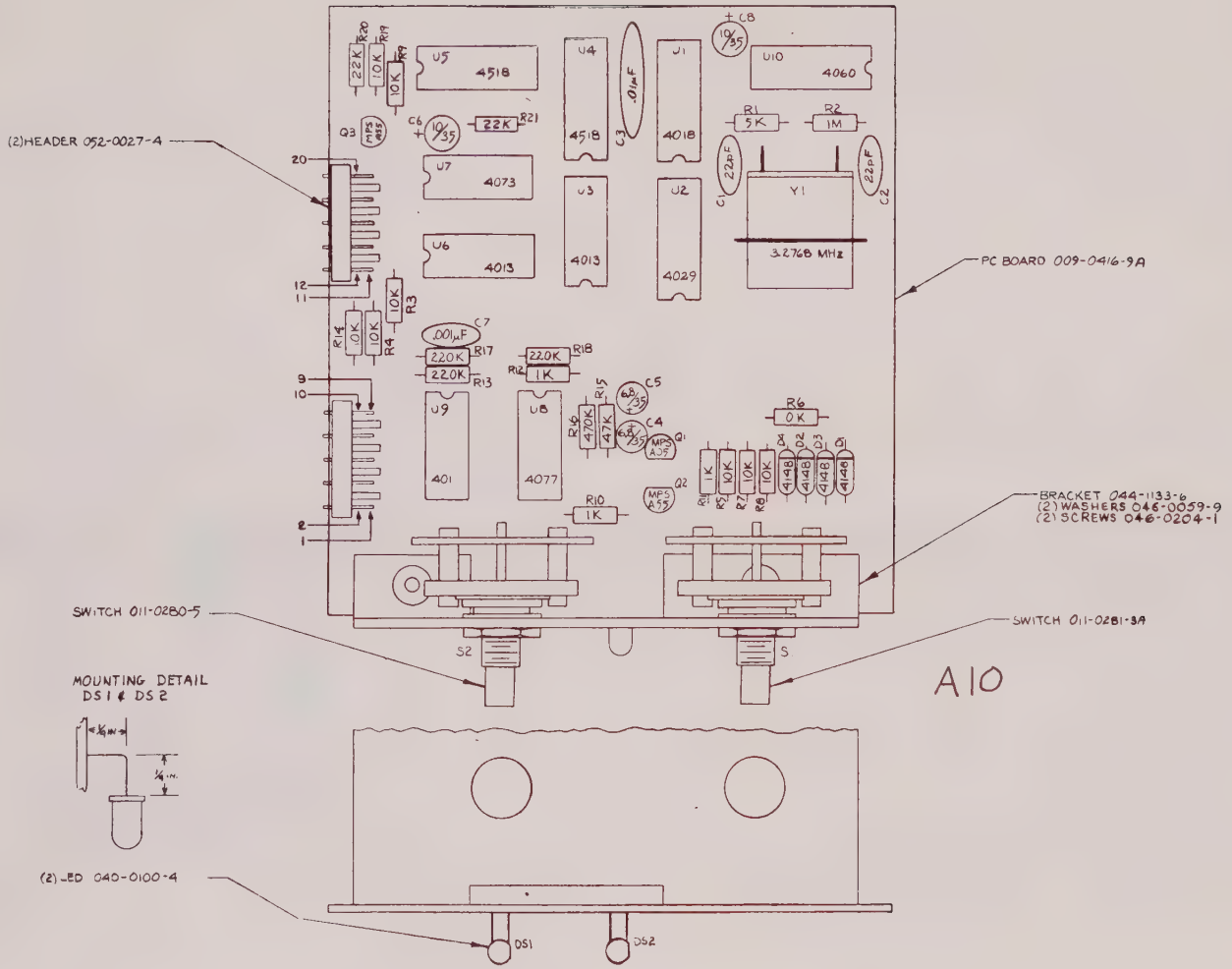


FIGURE 8-17
Impulse Timer
P.C. Assembly A10

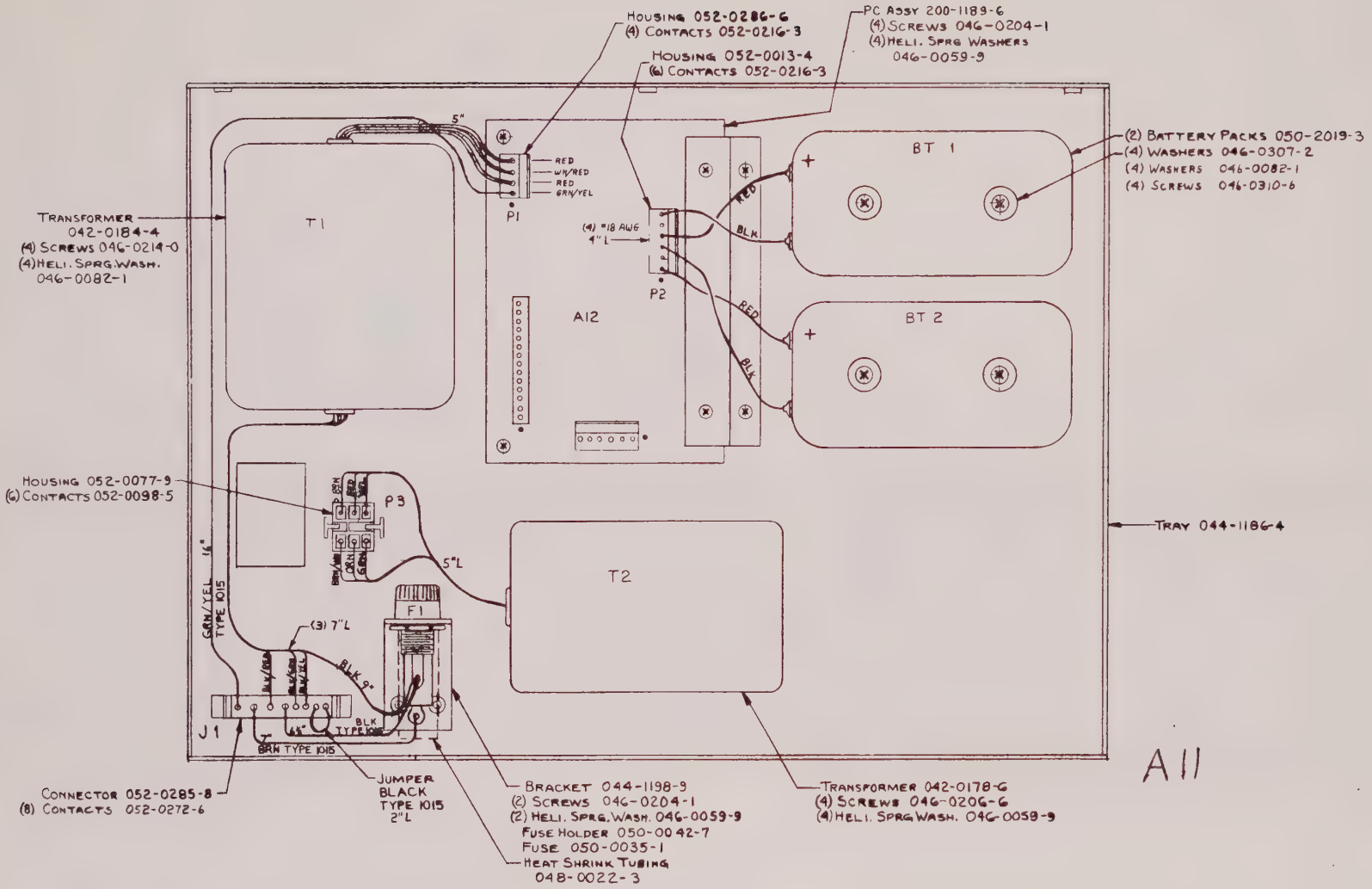
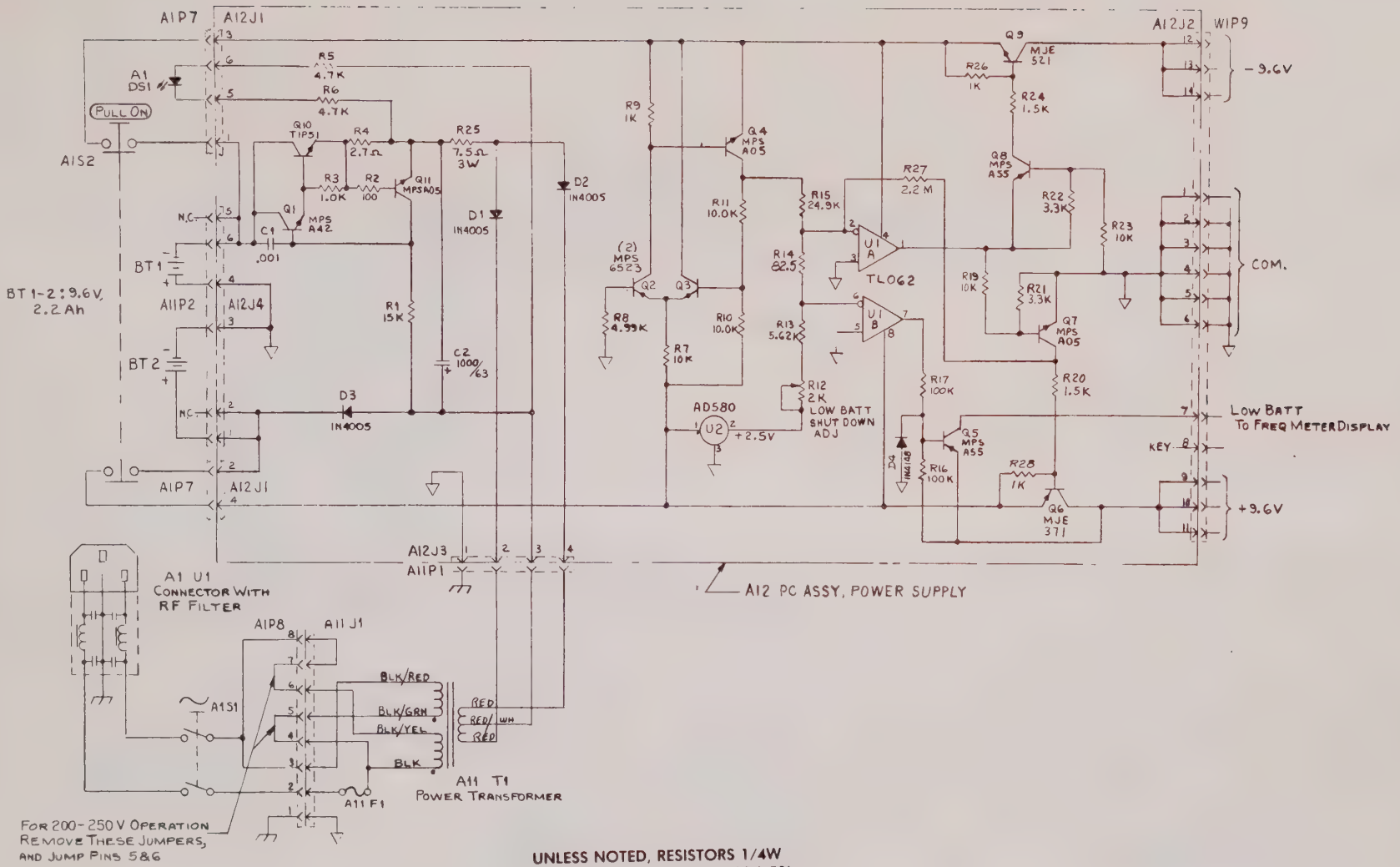


FIGURE 8-18
Power Supply Tray Assembly
P.C. Assembly A11



UNLESS NOTED, RESISTORS 1/4W
3 PLACE VALUES ±1% OTHERS ±5%

FIGURE 8-19
Power Supply
Schematic A12

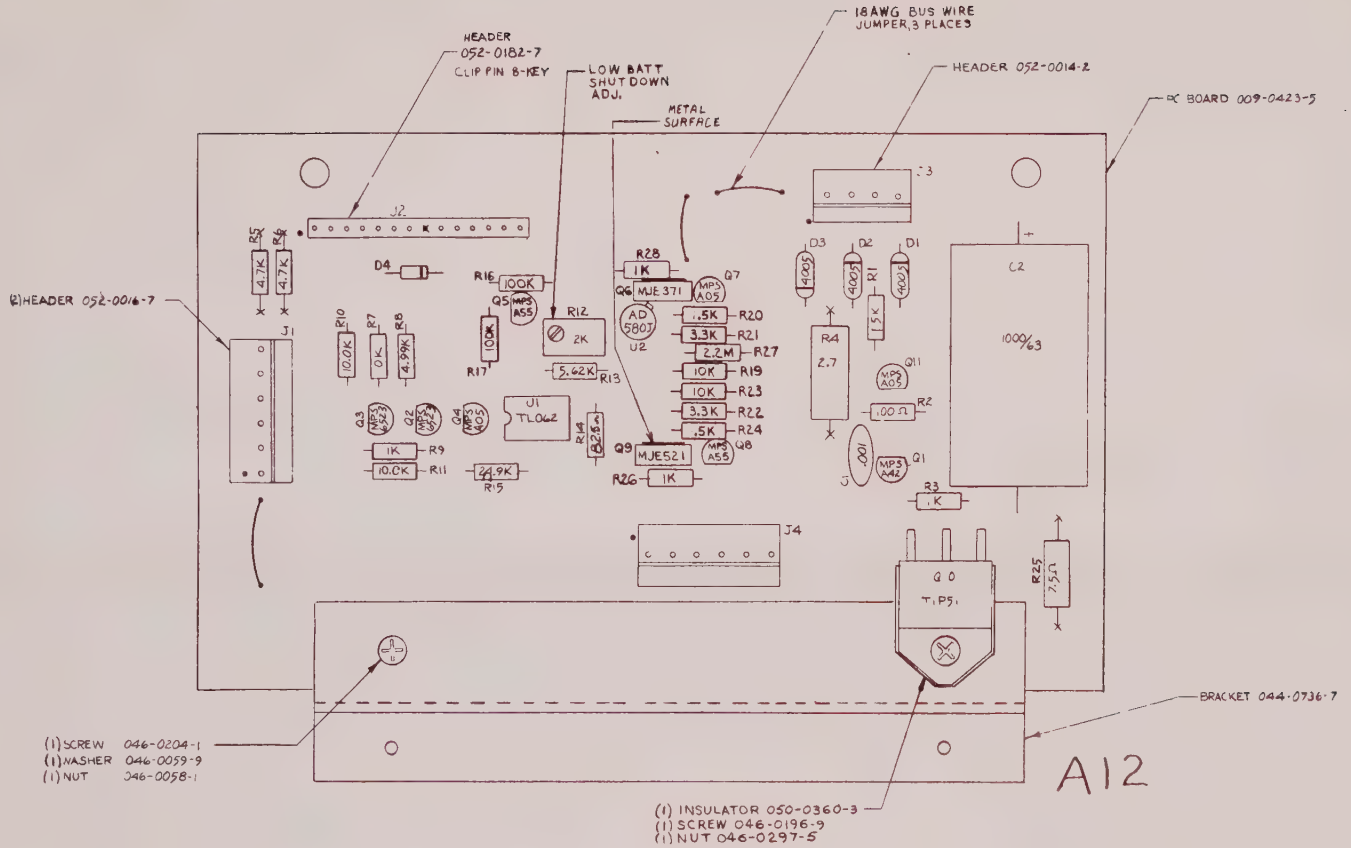
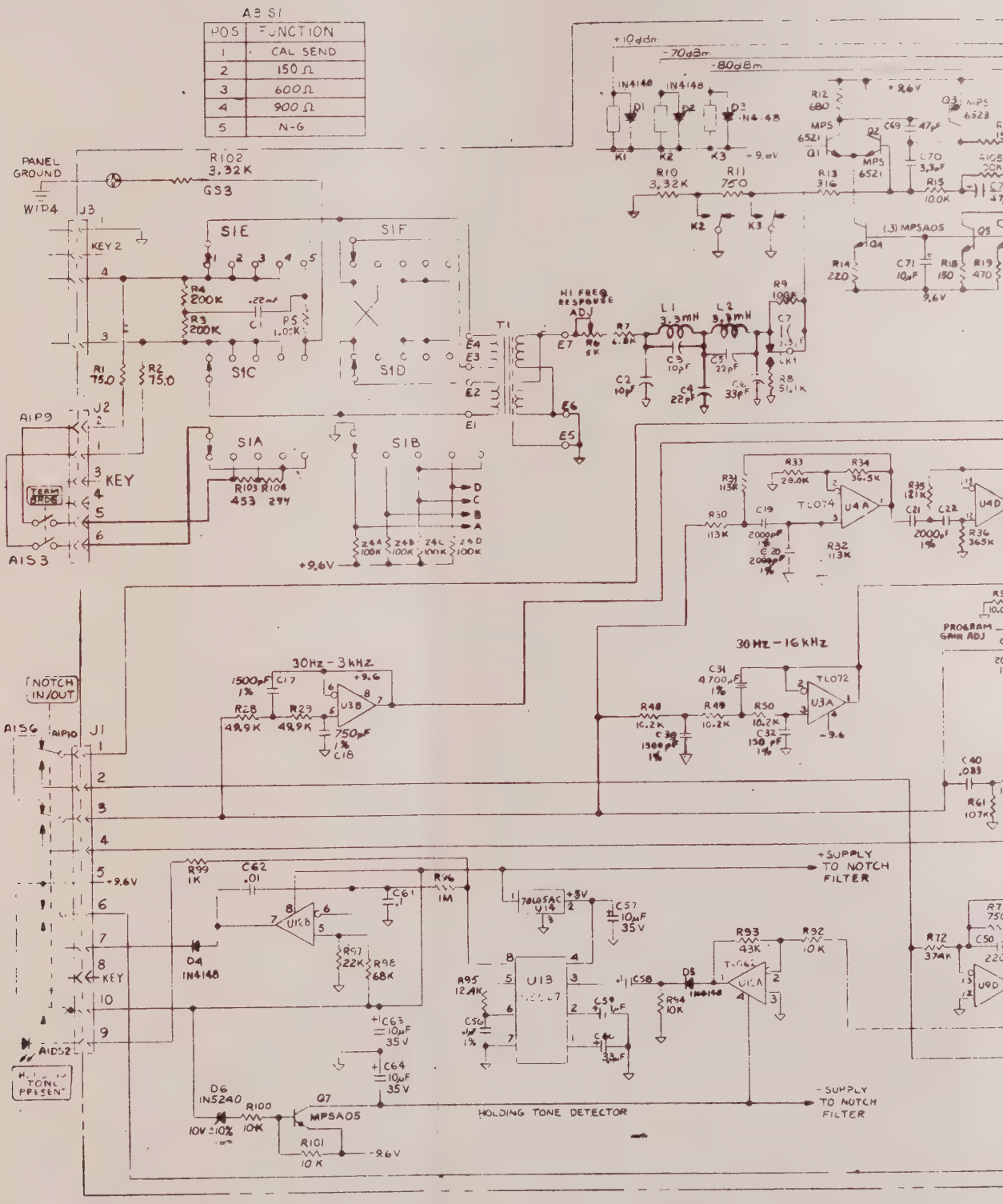
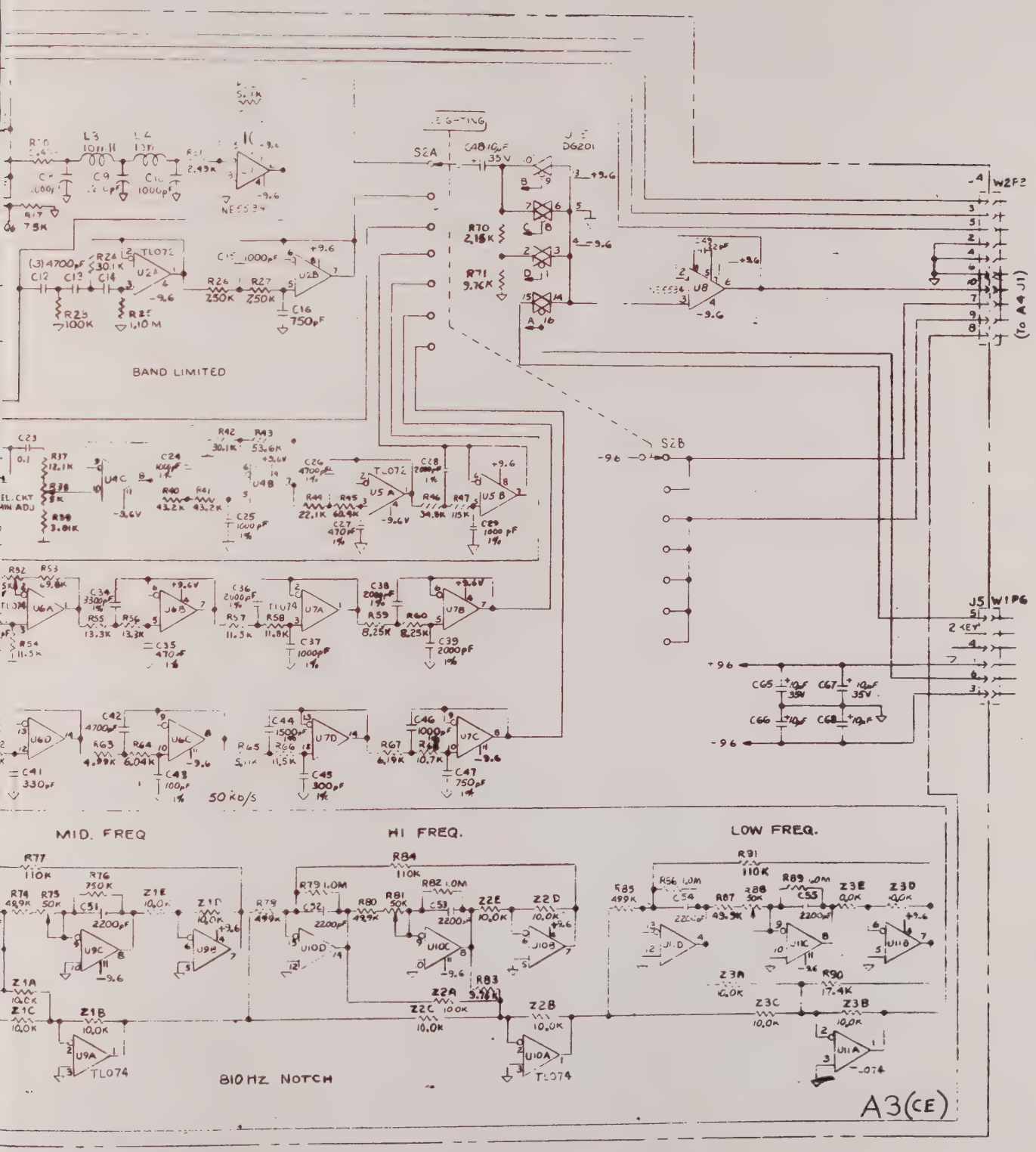


FIGURE 8-20
Power Supply
P.C. Assembly A12


A3 S1
POS FUNCTION
1 CAL SEND
2 150 Ω
3 600 Ω
4 900 Ω
5 N-G
PANEL GROUND
W1P4
J3
KEY 2
R102 3.32K
GS3
S1E
S1F
S1C
S1D
R4 200K
R3 200K
C1 .22mF
PS 1.0K
R1 75.0
R2 75.0
T1
HI FREQ RESPONSE ADJ
R7 4.8K
R9 100K
L1 3.3mH
L2 3.3mH
C7 3.3pF
C3 10pF
C5 22pF
C2 10pF
C4 22pF
C6 33pF
R8 51.1K
LK1
E1 E2 E3 E4 E5 E6 E7 R6 5K
A1P9
J2
KEY
TEAM ARDEC
A1S3
S1A
S1B
R103 453
R104 294
Z4A 100K
Z4B 100K
Z4C 100K
Z4D 100K
+9.6V
+10dBm
-70dBm
-80dBm
IN4148
D1
D2
D3
K1
K2
K3
+9.6V
-9.6V
R12 680
R13 316
R14 220
R15 10.0K
R16 150
R17 470
R18 10K
C69 47pF
C70 3.3pF
C71 10μF
Q1 MPS 6521
Q2 MPS 6521
Q3 MPS 6523
Q4
Q5
(3) MPSA05
R10 3.32K
R11 750
R33 20.0K
R34 36.5K
R31 113K
R30 113K
R32 113K
C19 2000pF
C20 2000pF
C21 2000pF
C22
R35 121K
R36 365K
TL074
U4A
U4D
30Hz-3kHz
C17 1500pF
R28 49.9K
R29 49.9K
U3B
C18 750pF
30Hz-16kHz
C31 4700μF
R48 10.2K
R49 10.2K
R50 10.2K
C32 130pF
C30 1500pF
U3A
TL072
-9.6
PROGRAM GAIN ADJ
C40 .033
R61 107K
NOTCH IN/OUT
A1S6
A1P10
J1
+9.6V
KEY
A1D52
HOLDING TONE PRESENT
R99 1K
C62 .01
C61 .1
R96 1M
U12B
R97 22K
R98 68K
D4 IN4148
+SUPPLY TO NOTCH FILTER
7805AC
U14
+5V
C57 10μF 35V
R93 43K
R92 10K
R72 374K
C50
U9D
U13
R95 12.4K
C56
C58
C59 1μF
C60 33μF
D5 IN4148
R94 10K
U12A
TL062
C63 10μF 35V
C64 10μF 35V
D6 IN5240
10V ±10%
R100 10K
Q7 MPSA05
R101 10K
-9.6V
HOLDING TONE DETECTOR
-SUPPLY TO NOTCH FILTER

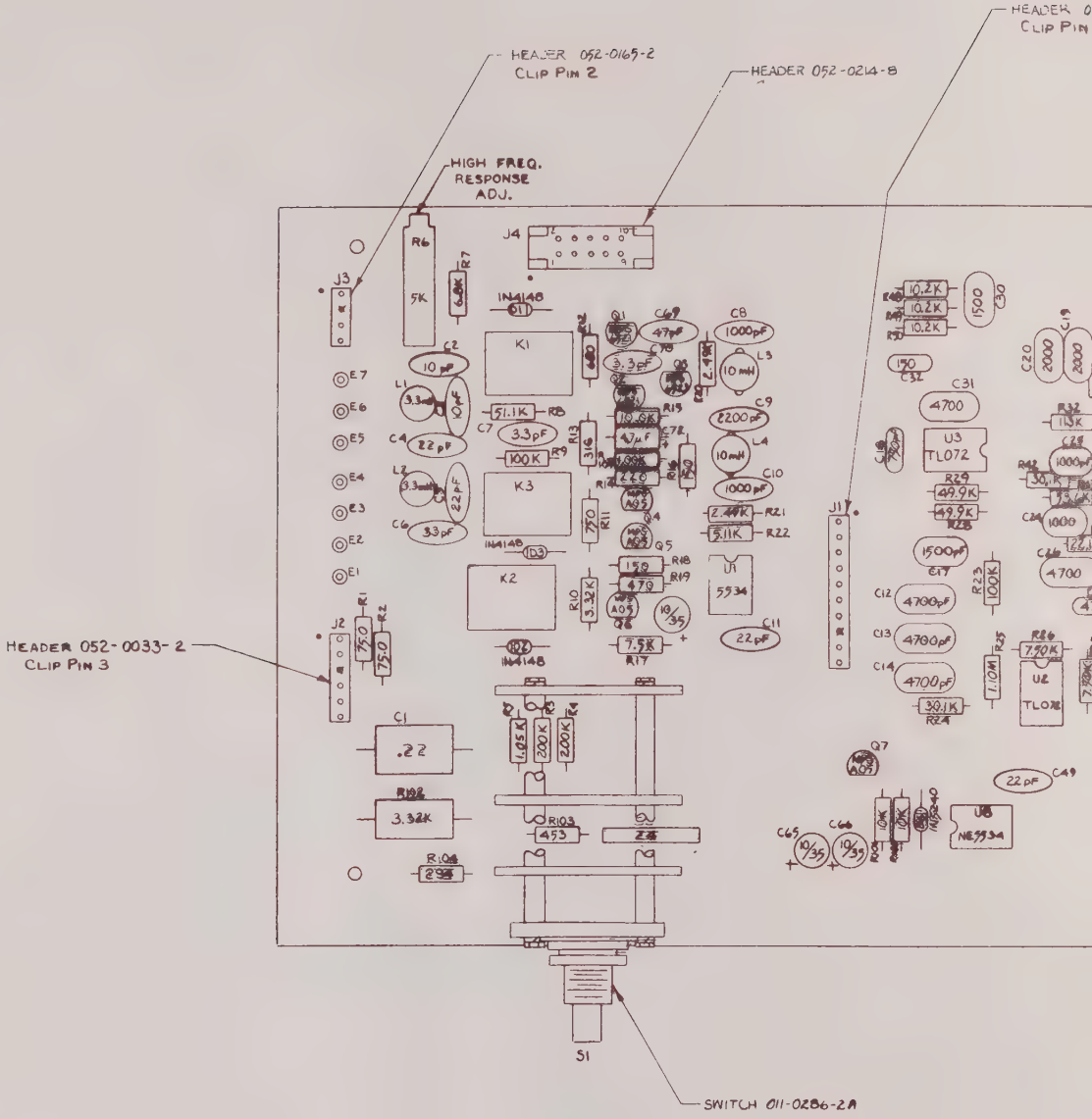


HIGHEST COMPONENT REFERENCE DESIGNATION		
R105	U15	Q7
C72	D6	L4

C69 UNUSED

UNLESS NOTED, RESISTORS 1/4W
3 PLACE VALUES ±1% OTHERS ±5%

FIGURE 8-21
Preamplifier and Weighting
Schematic A3(CE)


HEADER 052-0165-2
CLIP PIN 2
HEADER 052-0214-8
HIGH FREQ.
RESPONSE
ADJ.
HEADER 052-0033-2
CLIP PIN 3
SWITCH 011-0286-2A
S1
J1
J2
J3
J4
K1
K2
K3
U3
TL072
U5
5534
U8
NE5534
U2
TL072
R6
5K
R7
6.8K
C2
10 pF
L1
3.3mH
10pF
C4
22 pF
L2
3.3mH
22pF
C6
33 pF
C7
3.3pF
R8
51.1K
R9
100K
R13
316
R11
750
R10
3.32K
R1
750
R2
750
C1
.22
R102
3.32K
R103
453
R104
2.95K
R1
1.05K
R3
200K
R4
200K
IN4148
D1
IN4148
D3
IN4148
D2
Q1
Q2
Q3
Q4
Q5
Q7
C49
47pF
3.3pF
C8
1000pF
L3
10 mH
L4
10 mH
C9
2200pF
C10
1000pF
R14
220
R15
10.6K
R16
47pF
R17
7.5K
R18
150
R19
470
C11
22pF
R21
2.49K
R22
5.11K
10/35
10.2K
10.2K
10.2K
1500
C30
150
C32
C31
4700
R29
49.9K
R28
49.9K
1500pF
C17
4700pF
C12
4700pF
C13
4700pF
C14
30.1K
R24
R23
100K
R25
1.01M
R26
7.50K
22 pF
C49
10K
10K
C65
10/35
C66
10/35
C19
2000
C20
2000
C24
1000
C25
1000pF
R32
11K
R33
30.1K
C46
4700
R30
7.50K

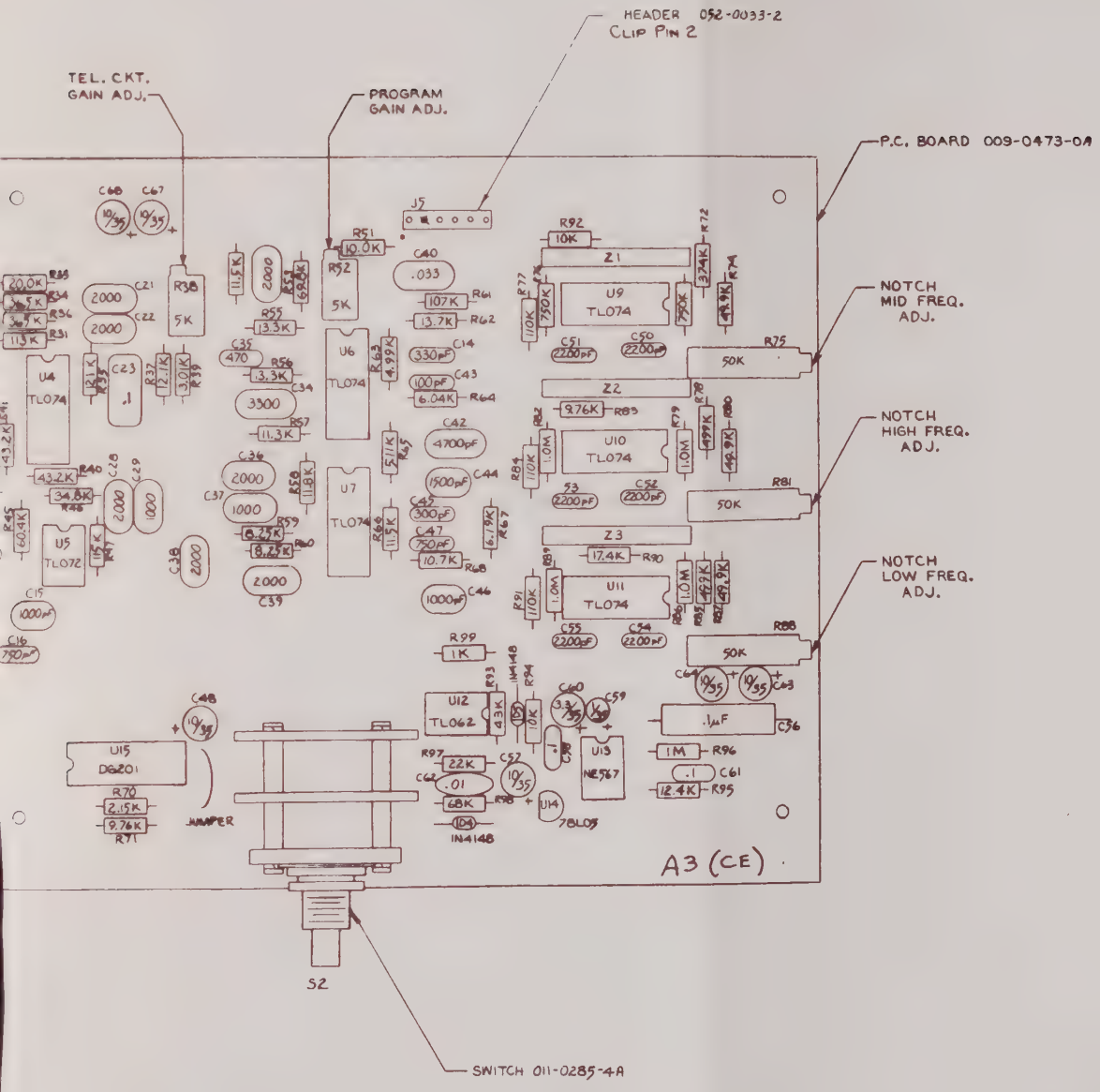


FIGURE 8-22
Preamplifier and Weighting
P.C. Assembly A3(CE)

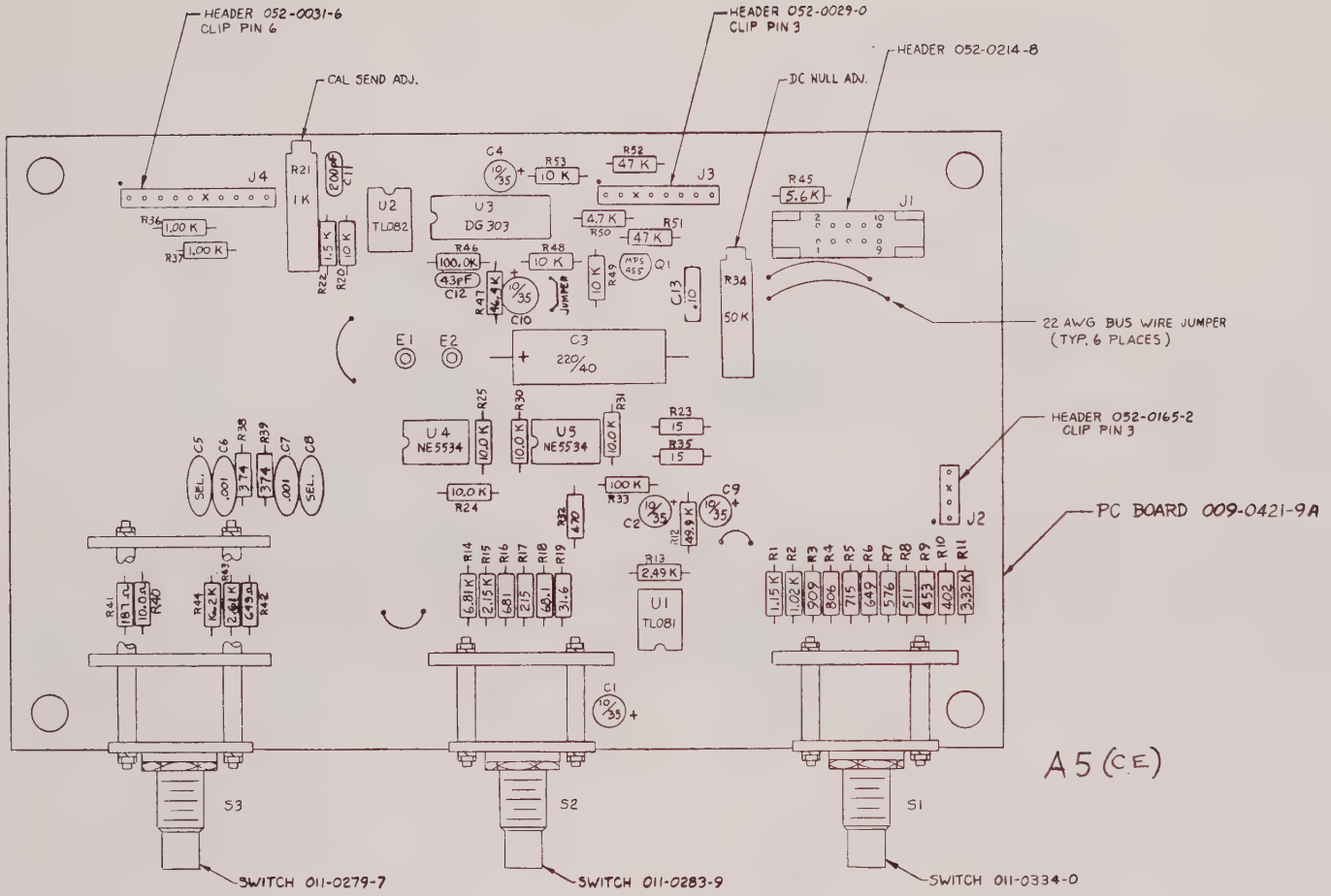


FIGURE 8-24
Send Amplifier
P.C. Assembly A5(CE)

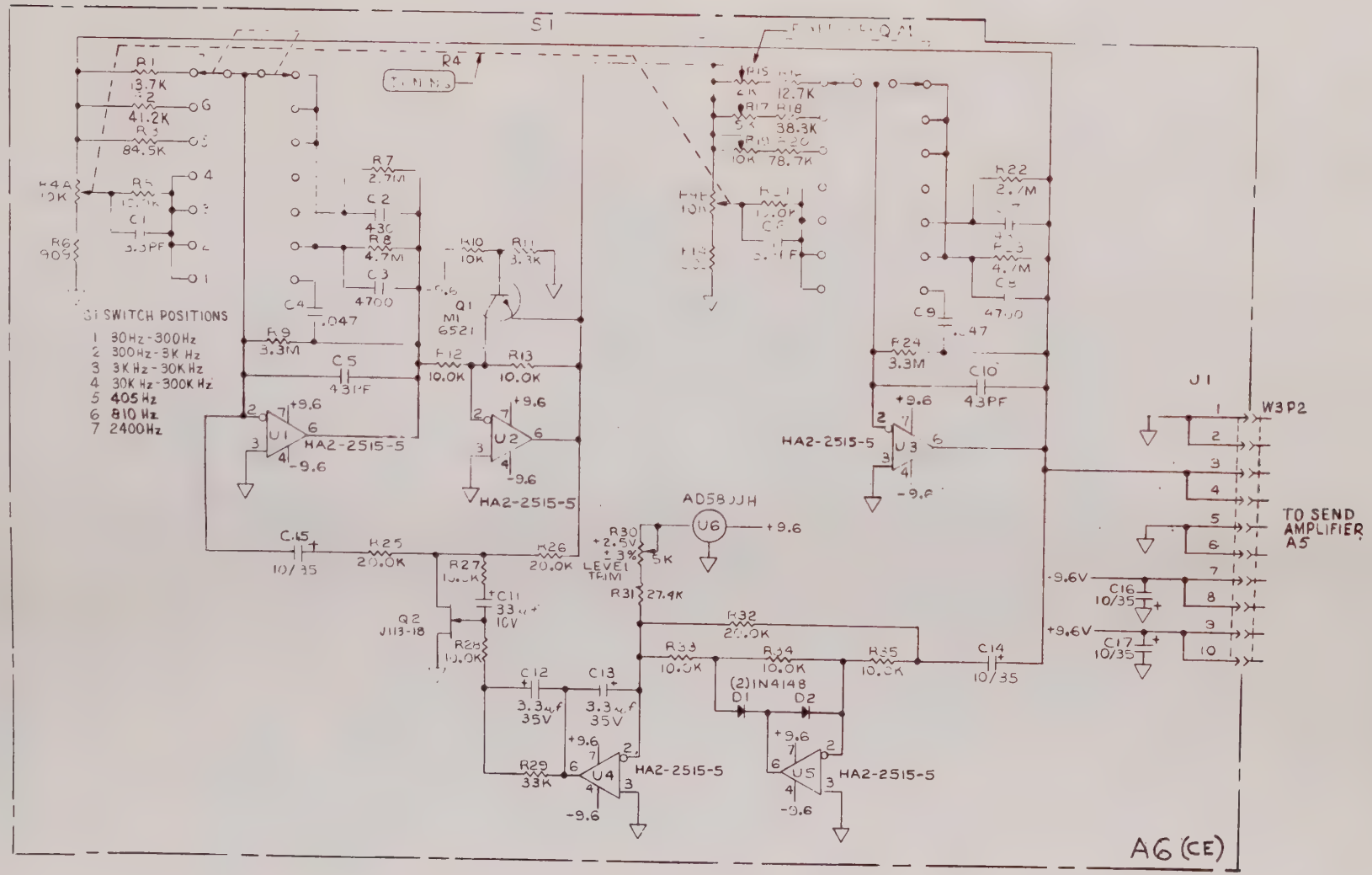
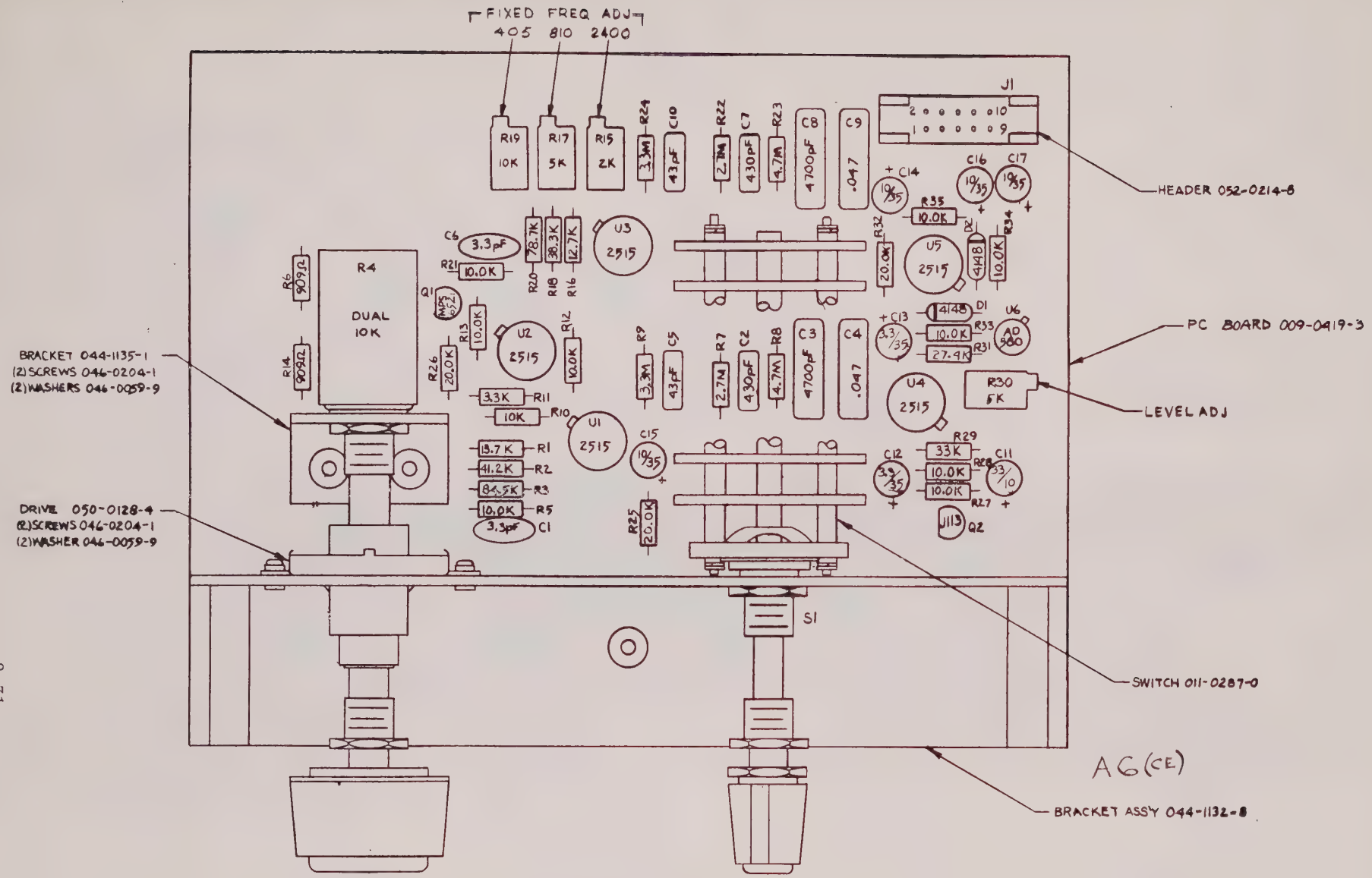


FIGURE 8-25
Oscillator
Schematic A6(CE)



FGURE 8-26
Oscillator
P.C. Assembly A6(CE)

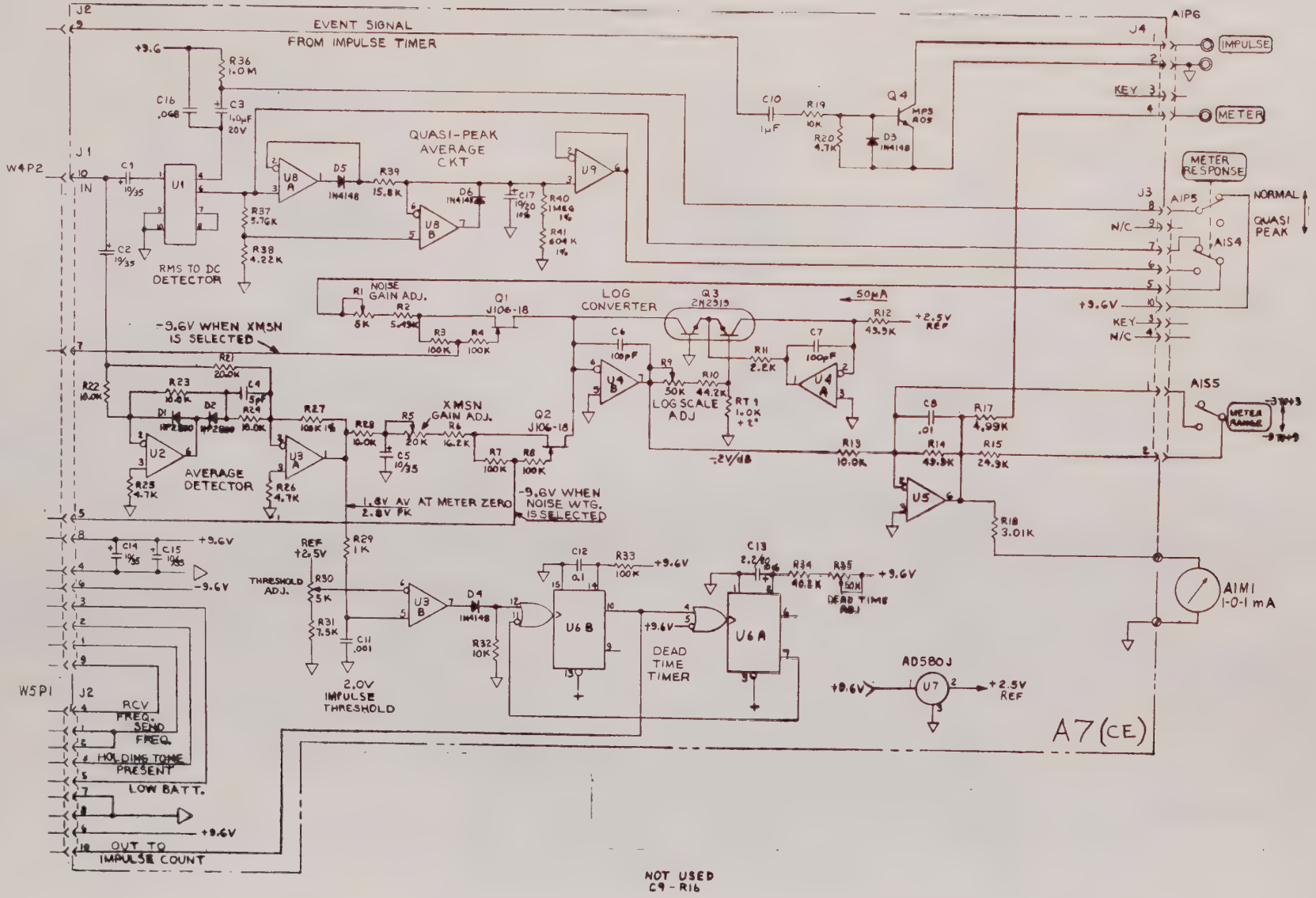


FIGURE 8-27
Meter Circuit
Schematic A7(CE)

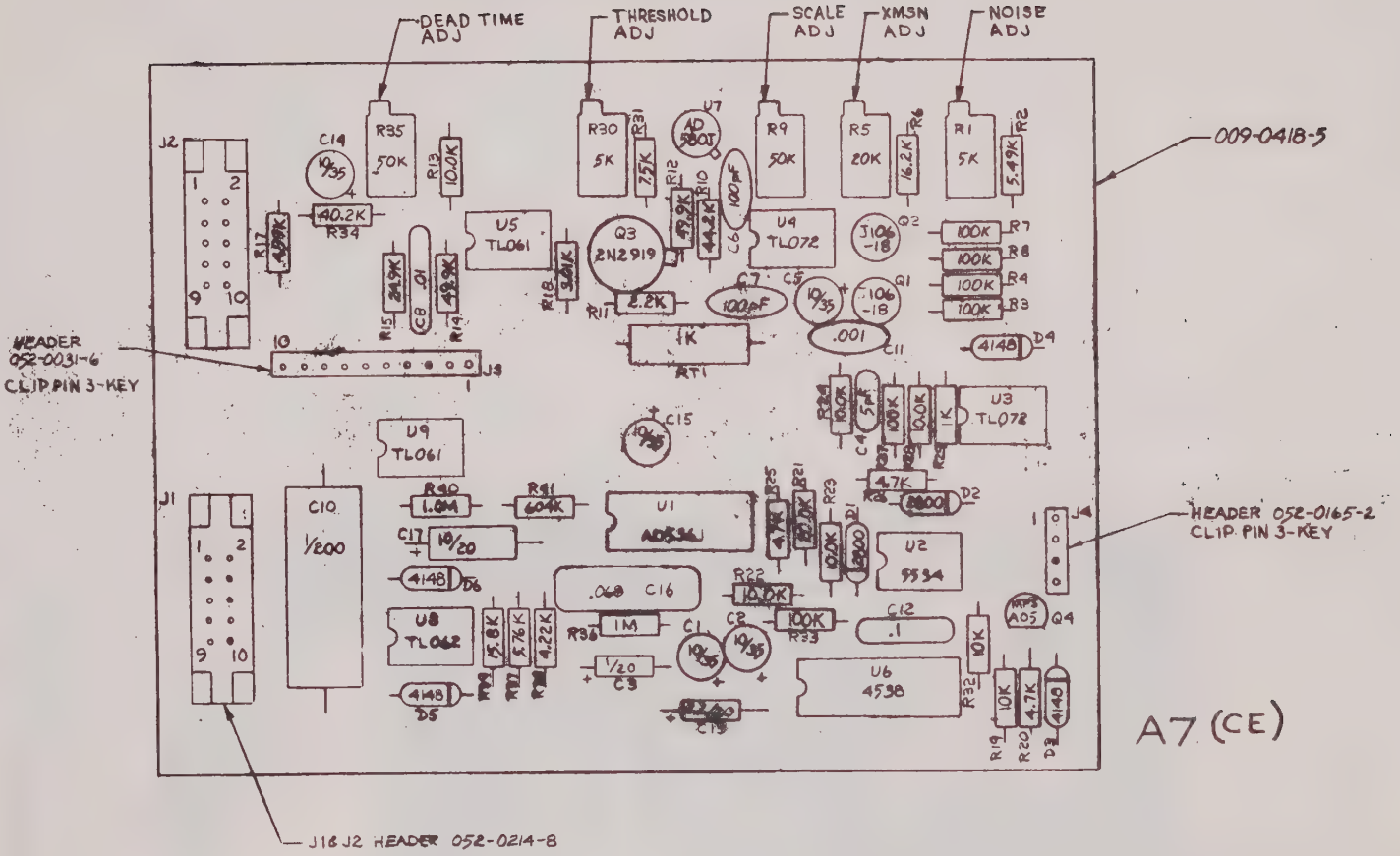
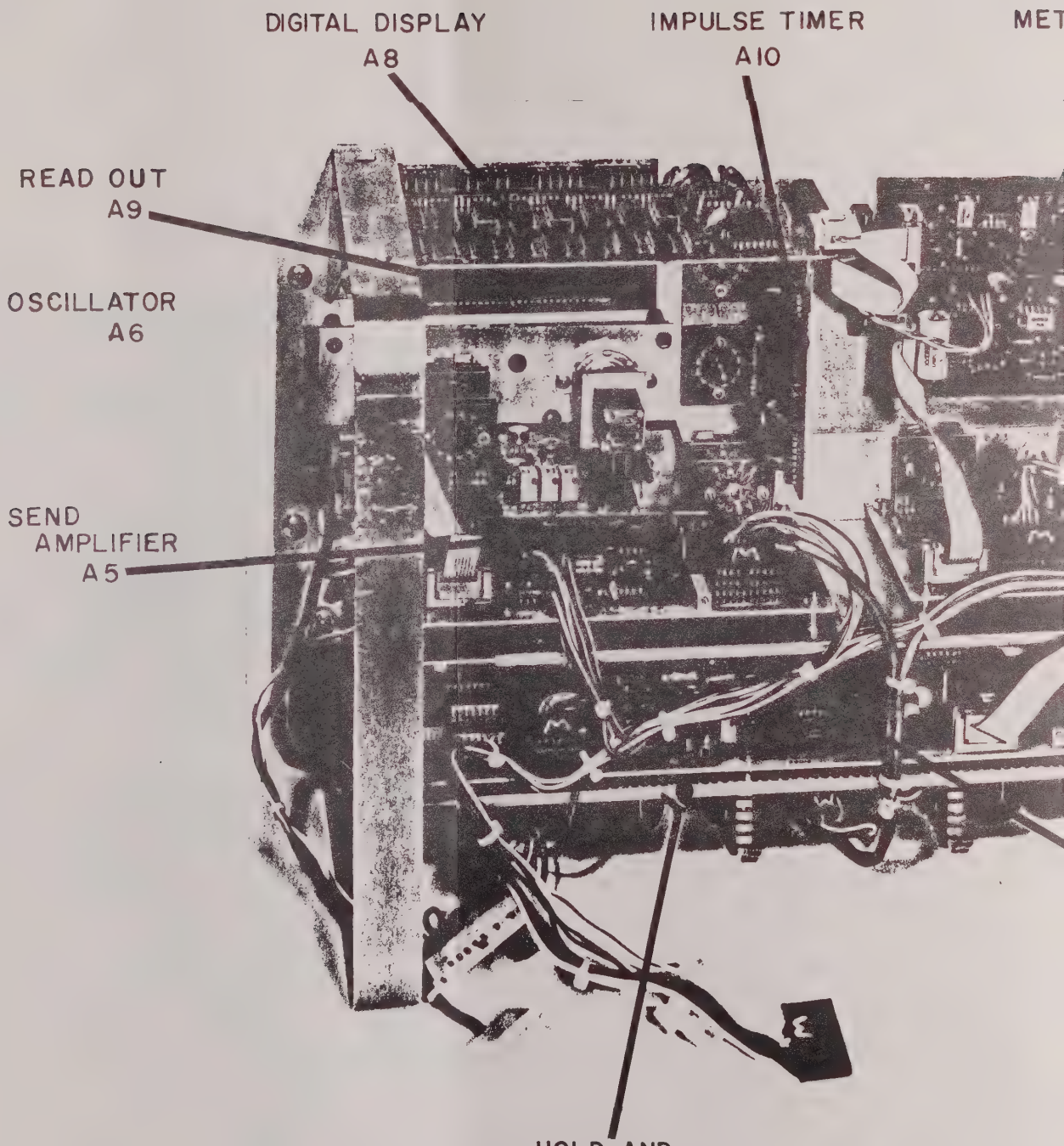


FIGURE 8-28
Meter Circuit
P.C. Assembly A7(CE)



T194C (TI94
(POW

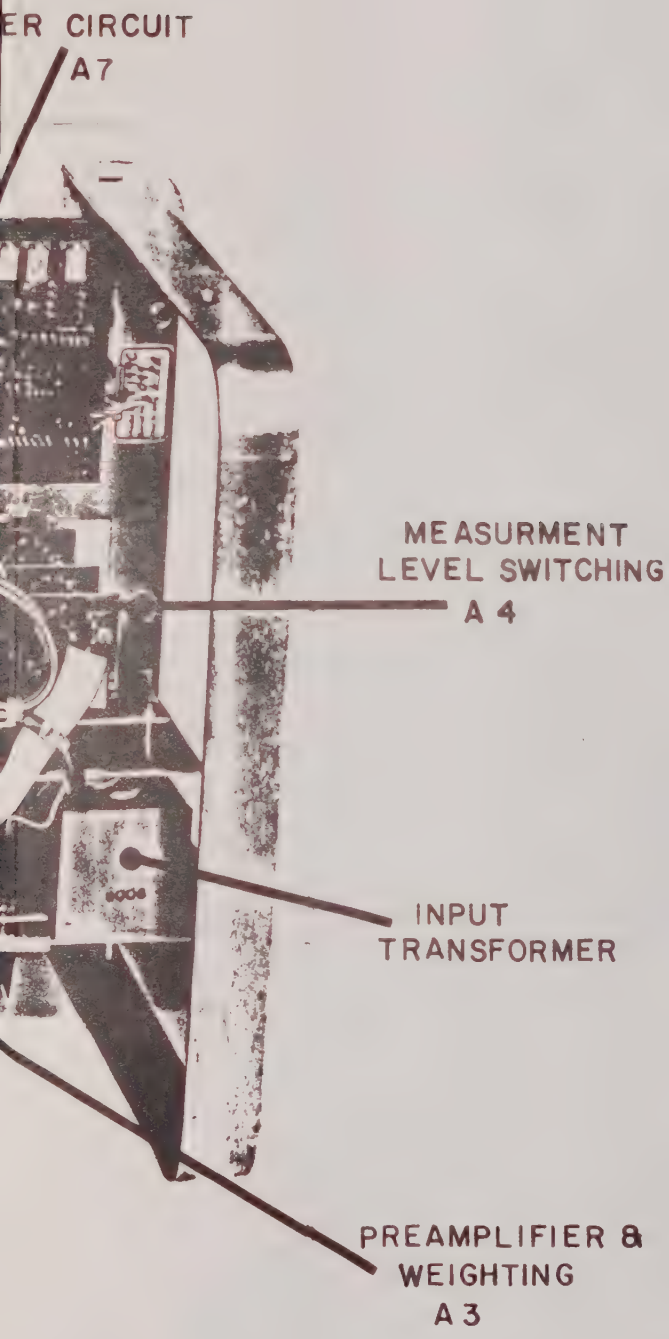
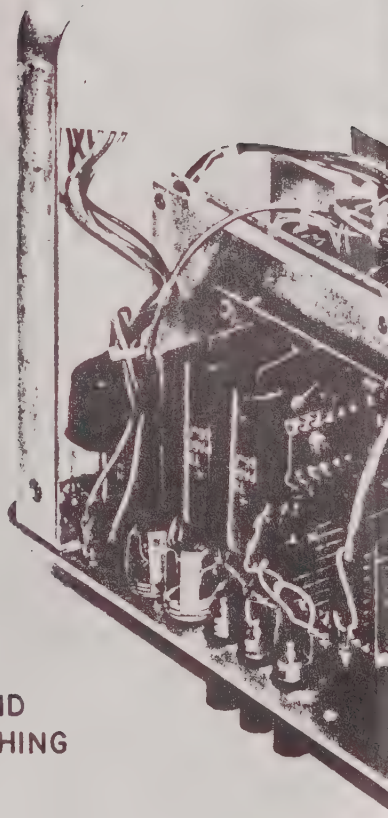
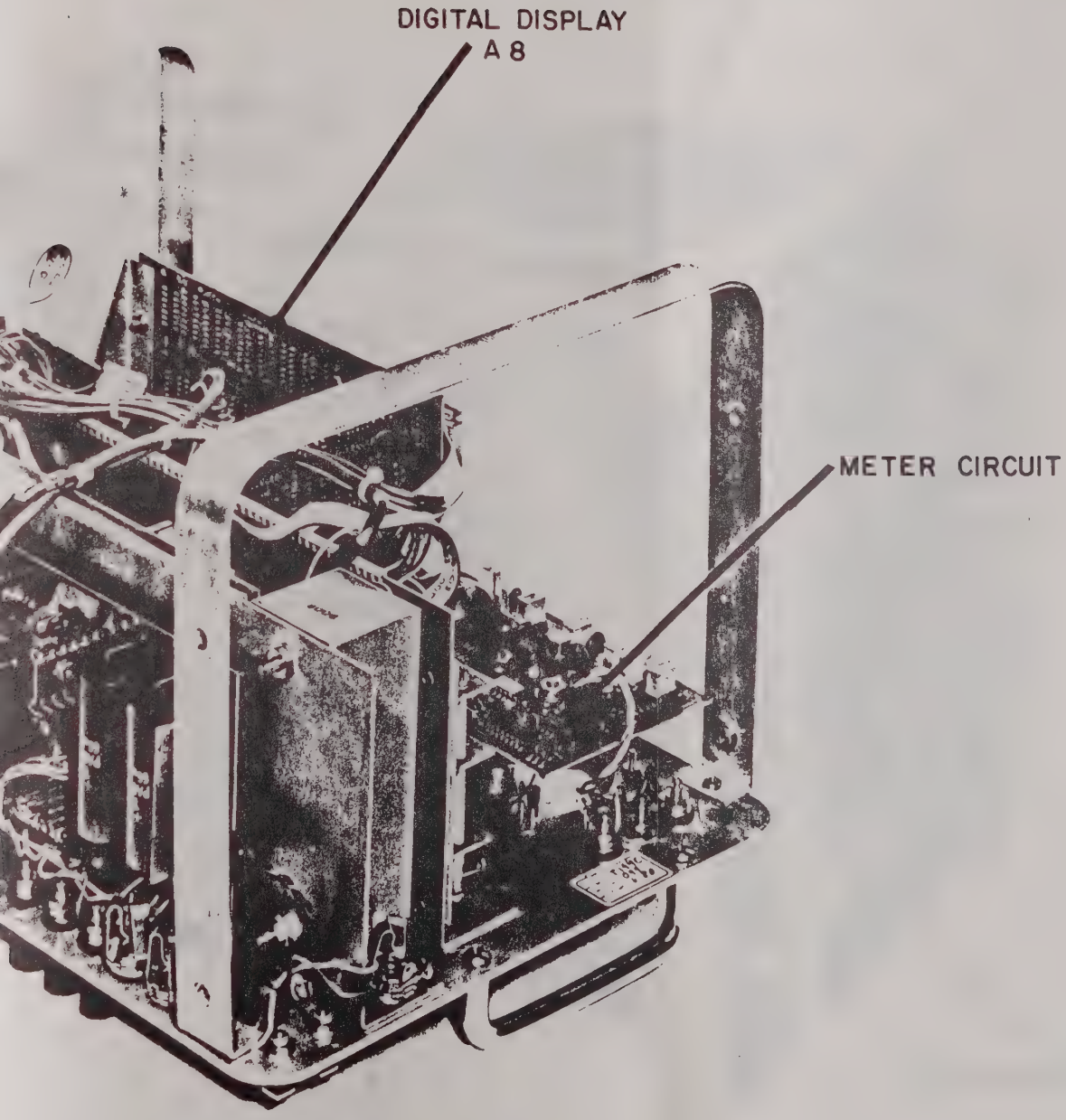


FIGURE 8-29
CE) P.C. ASSEMBLY LOCATION
ER SUPPLY REMOVED)



HOLD AND
LINE SWITCHING
A2

FIGURE 8-30
P. C. ASSEMBLY LOCATION
(CONTINUED)


DIGITAL DISPLAY
A 8
METER CIRCUIT

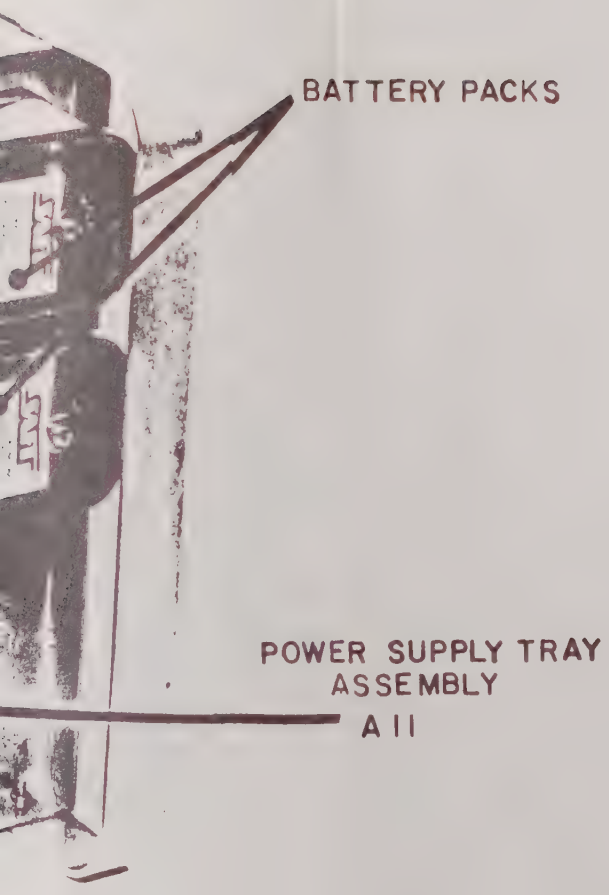


FIGURE 8-31
T194C (T194CE)
OWER SUPPLY ASSEMBLY

9.0 PARTS LIST

9.1 General

9.1.01 The Parts Lists provided on the following pages supply descriptions of the various assemblies, sub-assemblies and components that make up the Model T194C (T194CE) Transmission and Noise Test Set.

9.1.02 For those components purchased by Wilcom, the manufacturer and manufacturer's part number are provided. Those components manufactured by Wilcom are identified by a Wilcom part number.

9.1.03 Any required items may be ordered direct from Wilcom Products, Inc. or from the manufacturer.

9.2 PARTS LISTS - The Parts Lists are separated according to model. Listed below and in the CONTENTS are the Title, Assembly number and page on which each is found.

T194C PARTS LIST

Title	Assembly Number	Page
Front Panel Assembly	A1	9-2
Hold and Line Switching	A2	9-6
Preamplifier and Weighting	A3	9-9
Measurement Level Switching	A4	9-18
Send Amplifier	A5	9-22
Oscillator	A6	9-27
Meter Circuit	A7	9-30
Frequency Meter	A8	9-34
Readout	A9	9-37
Impulse Timer	A10	9-38
Power Supply Tray Assembly	A11	9-41
Power Supply	A12	9-43

T194CE PARTS LIST

Title	Assembly Number	Page
Front Panel Assembly	A1	9-47
Hold and Line Switching	A2	9-6
Preamplifier and Weighting	A3	9-51
Measurement Level Switching	A4	9-18
Send Amplifier	A5	9-60
Oscillator	A6	9-65
Meter Circuit	A7	9-68
Frequency Meter	A8	9-34
Readout	A9	9-37
Impulse Timer	A10	9-38
Power Supply Tray Assembly	A11	9-41
Power Supply	A12	9-43

PARTS LIST

TITLE OR DESCRIPTION — PREP JMB 01/31/80

FRONT PANEL ASSY (A1) 0194C	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV	CHECK EHB 07/08/80
	20011748	D	A	-	APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SIZE	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
000100	PANEL	1		04411963	C	B	WILCOM 60000015	0194-C	
000200	MADE-FROM	****							
000300	PANEL DETAIL	REF		04411971	C	A	WILCOM 60000015	0194-C	
000400	PC ASSY, HOLD & LINE SWITCHING (A2)	1		20011763	C	C	WILCOM 60000015	0194-C -	
000500	PREAMP & WEIGHTING ASSY	1		20013066	C	-	WILCOM 60000015	0194-C -	
000600	MEASURE LEVEL & SEND AMP ASSY	1		20013074	C	-	WILCOM 60000015	0194-C -	
000700	PC ASSEMBLY, OSCILLATOR (A6)	1		20012852	C	-	WILCOM 60000015	0194-C -	
000800	PC ASSY, METER CIRCUIT (A7)	1		20011821	B	A	WILCOM 60000015	0194-C -	
000900	METER	1		01500636	B	-	WILCOM 60000015	0194-C	
001000	WIRED SWITCH ASSY, METER CIRCUIT (S4,S5,P3)	1		20013082	B	-	WILCOM 60000015	0194-C -	
001100	TIME AND COUNT ASSY (PART OF A1)	1		20011847	B	-	WILCOM 60000015	0194-C -	
001200	POWER SUPPLY TRAY ASSY (A11)	1		20011888	C	A	WILCOM 60000015	0194-C -	
001300	CONNECTOR & SWITCH ASSY, AC LINE (115V)	1		20012860	B	B	WILCOM 60000015	0194-C -	
001400	WIRED SWITCH ASSY, PULL ON (PART OF A1)	1		20012878	A	A	WILCOM 60000015	0194-C -	
001450	PANEL WINDOW	1		04412615	A	-	WILCOM 60000015	0194-C -	11460

PARTS LIST

TITLE OR DESCRIPTION: FRONT PANEL ASSY (A1) 0194C

PART/DRAWING #: 20011748 | DWG SIZE: D | DWG REV: A | P/L REV: -

PREP JMB 01/31/80
CHECK EHB 07/08/80
APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
001500	JACK, PHONE: 3 COND (DBL OPEN CKT) J 1		3	1	05201587			SWCRAFT 60100732	12B	
001600	JACK, PHONE: 3 COND, .2D (T CLOSED CKT/R OPEN CKT)		2	1	05201140			SWCRAFT 60100732	S-13B	
001700	WIRED SWITCH ASSY, NOTCH FILTER	(PART OF A1)	1	1	20012936	B A		WILCOM 60000015	0194-C -	
001800	WIRED SWITCH ASSY, BRDG/TERM	(PART OF A1)	1	1	20012944	A A		WILCOM 60000015	0194-C -	
001900	HARNESS ASSY, MAIN	(W1)	1	1	20012902	C A		WILCOM 60000015	0194-C -	
002000	WIRED CONTROL ASSY, VERNIER LEVEL	(PART OF A1)	1	1	20012886	A A		WILCOM 60000015	0194-C -	
002100	CABLE ASSY, RIBBON W 2,3	(W2,3)	2	1	20012910	A -		WILCOM 60000015	0194-C -	
002200	CABLE ASSY, RIBBON W 4,5	(W4,5)	2	1	20012928	A -		WILCOM 60000015	0194-C -	
002300	BINDING POST, BLACK		3	1	05201462			GRAYHILL 60101151	29-1 BLK	
002400	BINDING POST, RED		6	1	05201454			GRAYHILL 60101151	29-1 RED	
002500	DIAL POST		2	1	05017702	A -		WILCOM 60000015	0132-10-132	
002600	DIAL POST WASHER		1	1	04600185	A -		WILCOM 60000015	0051-00-142	
002700	BUSHING, SHOULDER	#6	2	1	05017710			KEYSTONE 60100468	3058	
002800	BRACKET		3	1	04411757	C -		WILCOM 60000015	0194-C	
002900	LED HOLDER, BLACK: T-1-3/4 CYLINDRICAL		4	1	05000815			MONSANTO 60100948	MP52	

PARTS LIST

TITLE OR DESCRIPTION		PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
						PREP JMB	01/31/80
						CHECK EMB	07/08/80
* FRONT PANEL ASSY (A1) 0194C		20011748	D	A	-	APRVD RHC	07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR	SZ	RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
003000	KNOB, BLK: 1/2 DIA W/BAR	1/4 BUSH	10	1	05001623				BUCKEYE 60100153	PS-508L-2-BLK	
003100	KNOB, BLK: 31/32 DIA	1/4 BUSH	1	1	05001714				BUCKEYE 60100153	PS-95-2-BLK	
003200	HANDLE, 4" OC MTG (DISCARD SCREWS PROVIDED)		2	1	05000575				BUDRADIO 60101532	H-9111B	
003300	HOUSING, .100 OC LOCKING	4 POS	3	1	05201751				AMP 60100062	1-87175-0	
003400	CONTACT, LOCKING, 22-26 AWG		8	1	05201843				AMP 60100062	87124-2	
003500	KEYING DEVICE		3	1	05201835				AMP 60100062	87179-1	
003600	MS, PHILLIPS, PAN HD	4-40 X .312	4	1	04602058	R	-		WILCOM 60000015	S P 4-40X.312	
003700	MS, PHILLIPS, PAN HD	4-40 X .375	2	1	04602066	R	-		WILCOM 60000015	S P 4-40X.375	
003800	MS, PHILLIPS, PAN HD	6-32 X .312	10	1	04602132	R	-		WILCOM 60000015	S P 6-32X.312	
003900	MS, PHILLIPS, FLAT HD	6-32 X .312	6	1	04602504	R	-		WILCOM 60000015	S F 6-32X.312	
004000	MS, PHILLIPS, PAN HD	10-32 X .500	4	1	04602371	R	-		WILCOM 60000015	S P 10-32X.500	
004100	WASHER, FLAT, NYLON (THIN)	#4	4	1	04600136				AMATOM 60100039	2202-N116	
004200	LOCKWASHER, HELICAL SPRING	#4	4	1	04600599	R	-		WILCOM 60000015	W H 4	
004250	LOCKWASHER, HELICAL SPRING	#10	4	1	04601290	R	-		WILCOM 60000015	W H 10	
004300	WASHER, FLAT, NYLON (THIN)	#6	10	1	04600128				AMATOM 60100039	2203-N129	

PARTS LIST

TITLE OR DESCRIPTION: FRONT PANEL ASSY (A1) 0194C

PART/DRAWING #: 20011748 | DWG SIZE: D | DWG REV: A | P/L REV: -

PREP JMB 01/31/80
CHECK EMB 07/08/80
APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
0044001	NUT, HEX, 1/4 AF	4-40	2	04600581	R	-	WILCOM 60000015	N H	4-40	
0045001	NUT, HEX, 1/4 AF (SPECIAL)	6-32	4	04600805	R	-	WILCOM 60000015	N S	6-32	
0046001	SOLDER LUG (FOR #6 FASTENER)		2	05019781			H H SMITH 60101300	1414-6		
0047001	SOLDER LUG (FOR #10 FASTENER)		9	05017231			H H SMITH 60101300	1414-10		
0047501	GROMMET, CONTINUOUS		2	05003736			RICHCO PLA 60103314	SNGS-2		
0048001	WIRE, HOOKUP 22AWG (7X30)	BRN	A/R	04800348			BELDEN 60101250	8503	BRN	
0049001	WIRE, HOOKUP 22AWG (7X30)	YEL	A/R	04800322			BELDEN 60101250	8503	YEL	
0050001	WIRE, HOOKUP 22AWG (7X30)	GRN	A/R	04800405			BELDEN 60101250	8503	GRN	
0051001	WIRE, HOOKUP 22AWG (7X30)	WHT	A/R	04800355			BELDEN 60101250	8503	WHT	

******* END OF PARTS LIST *******

PARTS LIST

PREP RFL 09/17/79
CHECK EHB 03/14/80
APRVD RHC 03/14/80

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV
* PC ASSY, HOLD & LINE SWITCHING (A2) 0194C *	20011763	C	C	B

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANIST	WILCOM PART/DWG	DR SZ	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
000100	PC BOARD, HOLD AND LINE SWITCHING		1	00904102	C	A	WILCOM 60000015	0194-C	
000200	SOLDER MASK FOR 00904102, HOLD & LINE SWITCHING		REF	50007541	C	A	WILCOM 60000015	0194-C -	
000400	RESISTOR, STABLE FILM: 1%, .25W	10.0 K	21	00102061			TRW/IRC 60100781	T055 10.0 K	11239
	R 4,9								
000500	RESISTOR, STABLE FILM: 1%, .25W	1.00 K	21	00109157			TRW/IRC 60100781	T055 1.00 K	
	R 5,10								
000600	RESISTOR, STABLE FILM: 1%, .25W	35.7 K	21	00109587			TRW/IRC 60100781	T055 35.7 K	
	R 1,6								
000700	RESISTOR, STABLE FILM: 1%, .25W	100 K	21	00111153			TRW/IRC 60100781	T055 100 K	
	R 2,7								
000800	RESISTOR, STABLE FILM: 1%, .75W	16.2 OHM	21	00114116			TRW/IRC 60100781	T060 16.2 OHM	
	R 3,8								
000900	TRANSISTOR, PNP GP		21	00500017			MOTO SEMI 60100872	MPSA55	
	Q 1,4								
001000	TRANSISTOR, PNP HIGH VOLTAGE		21	00500132			MOTO SEMI 60100872	MPSA92	
	Q 2,5								
001100	TRANSISTOR, NPN POWER		21	00500249			MOTO SEMI 60100872	MJE340	
	Q 3,6								
001200	HEAT SINK		21	05000252			IERC 60103595	PS82-1ND	
001300	VARISTOR, PROTECTIVE: MAX DC VOLTAGE, 175V		21	04000527			GE SEMI 60103405	V130LA10A	
	RV 1,2								
001400	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V	10 UF	21	00301937			ITT SEMI 60101029	TAP-A10K35	
	C 1,6								
001500	CAPACITOR, ALUM ELECT: 300V	66 UF	41	00314963			TRANSPECT 60103306	PA66NW300I	
	C 2,3,4,5								
001600	DIODE, RECTIFIER, 1A		81	04000824			MOTO SEMI 60100872	1N4005	
	D 1-8								

PARTS LIST

PREP RFL 09/17/79
CHECK EHB 03/14/80
APRVD RHC 03/14/80

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV
PC ASSY, HOLD & LINE SWITCHING (A2) 0194C	20011763	C	C	B

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
001650	CAPACITOR, DISC: 5%, 500V, NPO C 7,8	22 PF	2	1	00305482			EIA STD 60107604	CC0391C0G220J501	11239
001700	COMPONENT CLIP, 3/4 DIA		4	1	05003025			RICHCO PLA 60103314	V-1008	
001800	MS, PHILLIPS, PAN HD	4-40 X .312	2	1	04602058	1R	1-	WILCOM 60000015	S P 4-40X.312	
001900	LOCKWASHER, HELICAL SPRING	#4	4	1	04600599	1R	1-	WILCOM 60000015	W H 4	
002000	NUT, HEX, 1/4 AF	4-40	2	1	04600581	1R	1-	WILCOM 60000015	N H 4-40	
002050	RIVET, TUBULAR, STEEL NI PLATE	4/16 L	4	1	04600367			ACME RIV 60101458	JT-218X4/16 S NI	
002100	HEADER, STR POST, .100 OC J 2,3	4 POS	2	1	05201652			AMP 60100062	87348-4	
002200	HEADER, RT ANGLE POST, .100 OC J 1,4,5	4 POS	3	1	05202247			MOLEX 60101847	22-05-2041	
002300	SWITCH ASSEMBLY, PUSH BUTTON S 1		1	1	01102904	1A	1-	WILCOM 60000015	0194-C	
002400	MS, PHILLIPS, PAN HD	4-40 X .250	4	1	04602041	1R	1-	WILCOM 60000015	S P 4-40X.250	
002450	WASHER, COMPRESSION: ID .120, OD .270	#4	2	1	05020839			MOTO SEMI 60100872	R52200F006	11285
002500	WAFER, INSULATING (THERM COND ELASTOMER)		2	1	05019831	1A	1A	WILCOM 60000015	0051-00-160	
002600	SHIELD		2	1	04411997	1A	1A	WILCOM 60000015	0194-C	
002700	SHIELD FIN (SWITCH)		3	1	04403705	1A	1A	WILCOM 60000015	0221-01-119	
002800	SPACER		2	1	05016787	1A	1-	WILCOM 60000015	0051-00-139	

PARTS LIST

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV	
PC ASSY, HOLD & LINE SWITCHING (A2) 0194C	20011763	C	C	B	PREP RFL 09/17/79 CHECK EMB 03/14/80 APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
0029001	SCHEMATIC, HOLD & LINE SWITCHING	REF		50007533	D	B	WILCOM 60000015	0194-C -	

******* END OF PARTS LIST *******

PARTS LIST

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
PC ASSY, PREAMP & WEIGHTING (A3) 0194C	20011771	D	D	D	PREP EHB	03/17/80
					CHECK EHB	07/08/80
					APRVD RHC	07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
0001001	PC BOARD, WEIGHTING CIRCUIT		1	1	00904250	D	A	WILCOM 60000015	0194		
0002001	SOLDER MASK FOR 00904250, WEIGHTING CIRCUIT		REF	1	50007525	D	A	WILCOM 60000015	0194-C -		
0003001	RESISTOR, STABLE FILM: 1%, .25W R 1,2	68.1 OHM	2	1	00109850			TRW/IRC 60100781	T055	68.1 OHM	1440
0004001	RESISTOR, STABLE FILM: 1%, .25W R 104	301 OHM	1	1	00110007			TRW/IRC 60100781	T055	301 OHM	
0005001	RESISTOR, STABLE FILM: 1%, .25W R 13	316 OHM	1	1	00110015			TRW/IRC 60100781	T055	316 OHM	
0006001	RESISTOR, STABLE FILM: 1%, .25W R 103	464 OHM	1	1	00108860			TRW/IRC 60100781	T055	464 OHM	
0007001	RESISTOR, STABLE FILM: 1%, .25W R 69	665 OHM	1	1	00110049			TRW/IRC 60100781	T055	665 OHM	
0008001	RESISTOR, STABLE FILM: 1%, .25W R 11	750 OHM	1	1	00110114			TRW/IRC 60100781	T055	750 OHM	
0008501	RESISTOR, STABLE FILM: 1%, .25W R 105	1.00 K	1	1	00109157			TRW/IRC 60100781	T055	1.00 K	1335
0009001	RESISTOR, STABLE FILM: 1%, .25W R 5	1.05 K	1	1	00109215			TRW/IRC 60100781	T055	1.05 K	
0010001	RESISTOR, STABLE FILM: 1%, .25W R 70	2.26 K	1	1	00109249			TRW/IRC 60100781	T055	2.26 K	
0011001	RESISTOR, STABLE FILM: 1%, .25W R 20,21	2.49 K	2	1	00109298			TRW/IRC 60100781	T055	2.49 K	
0012001	RESISTOR, STABLE FILM: 1%, .25W R 10	3.32 K	1	1	00110379			TRW/IRC 60100781	T055	3.32 K	
0013001	RESISTOR, STABLE FILM: 1%, .25W R 34	4.75 K	1	1	00110544			TRW/IRC 60100781	T055	4.75 K	
0014001	RESISTOR, STABLE FILM: 1%, .25W R 63	4.99 K	1	1	00101881			TRW/IRC 60100781	T055	4.99 K	

PARTS LIST

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV	
PC ASSY, PREAMP & WEIGHTING (A3) 0194C	20011771	D	D	D	PREP EMB 03/17/80 CHECK EMB 07/08/80 APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
001500	RESISTOR, STABLE FILM: 1%, .25W R 22,65	5.11 K	2	1	00110585			TRW/IRC 60100781	T055	5.11 K	
001600	RESISTOR, STABLE FILM: 1%, .25W R 64	6.04 K	1	1	00110668			TRW/IRC 60100781	T055	6.04 K	
001700	RESISTOR, STABLE FILM: 1%, .25W R 67	6.19 K	1	1	00114504			TRW/IRC 60100781	T055	6.19 K	
001800	RESISTOR, STABLE FILM: 1%, .25W R 26,27	7.50 K	2	1	00109322			TRW/IRC 60100781	T055	7.50K	
001900	RESISTOR, STABLE FILM: 1%, .25W R 15,32,49,71,83,95	10.0 K	6	1	00102061			TRW/IRC 60100781	T055	10.0 K	
002000	RESISTOR, STABLE FILM: 1%, .25W R 42	10.5 K	1	1	00109504			TRW/IRC 60100781	T055	10.5 K	
002100	RESISTOR, STABLE FILM: 1%, .25W R 68	10.7 K	1	1	00114736			TRW/IRC 60100781	T055	10.7 K	
002200	RESISTOR, STABLE FILM: 1%, .25W R 66	11.5 K	1	1	00110551			TRW/IRC 60100781	T055	11.5 K	
002400	RESISTOR, STABLE FILM: 1%, .25W R 51	13.3 K	1	1	00110619			TRW/IRC 60100781	T055	13.3 K	
002500	RESISTOR, STABLE FILM: 1%, .25W R 62	13.7 K	1	1	00102152			TRW/IRC 60100781	T055	13.7 K	
002600	RESISTOR, STABLE FILM: 1%, .25W R 90	15.0 K	1	1	00110676			TRW/IRC 60100781	T055	15.0 K	
002700	RESISTOR, STABLE FILM: 1%, .25W R 58	22.6 K	1	1	00109660			TRW/IRC 60100781	T055	22.6 K	
002800	RESISTOR, STABLE FILM: 1%, .25W R 56	24.3 K	1	1	00109736			TRW/IRC 60100781	T055	24.3 K	
002900	RESISTOR, STABLE FILM: 1%, .25W R 52	24.9 K	1	1	00109744			TRW/IRC 60100781	T055	24.9 K	
003000	RESISTOR, STABLE FILM: 1%, .25W R 43	26.7 K	1	1	00110783			TRW/IRC 60100781	T055	26.7 K	

PARTS LIST

TITLE OR DESCRIPTION

* PC ASSY, PREAMP & WEIGHTING (A3) 0194C

PART/DRAWING # 20011771

DWG SIZE D | DWG REV D | P/L REV D

PREP EHB 03/17/80
CHECK EHB 07/08/80
APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV1	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
003100	RESISTOR, STABLE FILM: 1%, .25W R 24	30.1 K	1	00110866			TRW/IRC 60100781	T055 30.1 K	
003200	RESISTOR, STABLE FILM: 1%, .25W R 40,41,55	31.6 K	3	00110916			TRW/IRC 60100781	T055 31.6 K	
003300	RESISTOR, STABLE FILM: 1%, .25W R 31	33.2 K	1	00110957			TRW/IRC 60100781	T055 33.2 K	
003400	RESISTOR, STABLE FILM: 1%, .25W R 35	44.2 K	1	00102574			TRW/IRC 60100781	T055 44.2 K	
003500	RESISTOR, STABLE FILM: 1%, .25W R 28,29,45,46,53,74,80,87	49.9 K	8	00102624			TRW/IRC 60100781	T055 49.9 K	
003600	RESISTOR, STABLE FILM: 1%, .25W R 8	51.1 K	1	00110817			TRW/IRC 60100781	T055 51.1 K	
003700	RESISTOR, STABLE FILM: 1%, .25W R 37,38	52.3 K	2	00110833			TRW/IRC 60100781	T055 52.3 K	
003800	RESISTOR, STABLE FILM: 1%, .25W R 30,57	54.9 K	2	00102665			TRW/IRC 60100781	T055 54.9 K	
003900	RESISTOR, STABLE FILM: 1%, .25W R 48	57.6 K	1	00114868			TRW/IRC 60100781	T055 57.6 K	
004000	RESISTOR, STABLE FILM: 1%, .25W R 47	63.4 K	1	00114850			TRW/IRC 60100781	T055 63.4 K	
004100	RESISTOR, STABLE FILM: 1%, .25W R 77,84,91	75.0 K	3	00111096			TRW/IRC 60100781	T055 75.0 K	
004150	RESISTOR, STABLE FILM: 1%, .25W R 39,48	84.5 K	2	00102806			TRW/IRC 60100781	T055 84.5 K	
004200	RESISTOR, STABLE FILM: 1%, .25W R 9,23	100 K	2	00111153			TRW/IRC 60100781	T055 100 K	
004300	RESISTOR, STABLE FILM: 1%, .25W R 61	107 K	1	00113639			TRW/IRC 60100781	T055 107 K	
004400	RESISTOR, STABLE FILM: 1%, .25W R 36	178 K	1	00111245			TRW/IRC 60100781	T055 178 K	

PARTS LIST

TITLE OR DESCRIPTION: PC ASSY, PREAMP & WEIGHTING (A3) 0194C | PART/DRAWING #: 20011771 | DWG SIZE: D | DWG REV: D | P/L REV: D | PREP EMB 03/17/80 | CHECK EMB 07/08/80 | APRVD RMC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
004500	RESISTOR, STABLE FILM: 1%, .25W	200 K	2	1	00111260			TRW/IRC 60100781	TO55	200 K	
	R 3,4										
004600	RESISTOR, STABLE FILM: 1%, .25W	374 K	1	1	00111427			TRW/IRC 60100781	TO55	374 K	
	R 72										
004700	RESISTOR, STABLE FILM: 1%, .25W	499 K	2	1	00111500			TRW/IRC 60100781	TO55	499 K	
	R 78,85										
004800	RESISTOR, STABLE FILM: 1%, .25W	750 K	2	1	00111575			TRW/IRC 60100781	TO55	750 K	
	R 73,76										
004900	RESISTOR, STABLE FILM: 1%, .25W	1.00 MEG	4	1	00111617			TRW/IRC 60100781	TO55	1.00 MEG	
	R 79,82,86,89										
005000	RESISTOR, STABLE FILM: 1%, .25W	1.10 MEG	1	1	00114785			TRW/IRC 60100781	TO55	1.10 MEG	
	R 25										
005100	RESISTOR, STABLE FILM: 5%, .25W	150 OHM	2	1	00103945			TRW/IRC 60100781	RG1/4	150 OHM	
	R 16,18										
005200	RESISTOR, STABLE FILM: 5%, .25W	220 OHM	1	1	00103978			TRW/IRC 60100781	RG1/4	220 OHM	
	R 14										
005300	RESISTOR, STABLE FILM: 5%, .25W	470 OHM	1	1	00104018			TRW/IRC 60100781	RG1/4	470 OHM	
	R 19										
005400	RESISTOR, STABLE FILM: 5%, .25W	680 OHM	1	1	00104042			TRW/IRC 60100781	RG1/4	680 OHM	
	R 12										
005500	RESISTOR, STABLE FILM: 5%, .25W	1 K	1	1	00104083			TRW/IRC 60100781	RG1/4	1 K	
	R 99										
005600	RESISTOR, STABLE FILM: 5%, .25W	6.8 K	1	1	00104257			TRW/IRC 60100781	RG1/4	6.8 K	
	R 7										
005700	RESISTOR, STABLE FILM: 5%, .25W	7.5 K	1	1	00104265			TRW/IRC 60100781	RG1/4	7.5 K	
	R 17										
005800	RESISTOR, STABLE FILM: 5%, .25W	10 K	4	1	00104281			TRW/IRC 60100781	RG1/4	10 K	
	R 92,98,100,101										
005900	RESISTOR, STABLE FILM: 5%, .25W	22 K	1	1	00104349			TRW/IRC 60100781	RG1/4	22 K	
	R 97										

PARTS LIST

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
PC ASSY, PREAMP & WEIGHTING (A3) 0194C	20011771	D	D	D	PREP EMB	03/17/80
					CHECK EMB	07/08/80
					APRVD RHC	07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
005950	RESISTOR, STABLE FILM: 5%, .25W 43 K	1	1	00104398			TRW/IRC 60100781	RG1/4 43 K	11467
	R 93								
006000	RESISTOR, STABLE FILM: 5%, .25W 68 K	1	1	00104430			TRW/IRC 60100781	RG1/4 68 K	
	R 98								
006200	RESISTOR, STABLE FILM: 5%, .25W 1 MEG	1	1	00113142			TRW/IRC 60100781	RG1/4 1 MEG	
	R 96								
006300	RESISTOR, STABLE FILM: 1%, 4A 3.32 K	1	1	00107532			TRW/IRC 60100781	GS3 3.32 K	
	R 102								
006400	POT, TRIM: 3/8 SQ E/A, 18T 1 K	2	1	00114165			BECK/HELI 60101417	68XR1K	
	R 33,50								
006500	POT, TRIM: RECT, 15T 5 K	1	1	00108092			BOURNS 60101649	3006P-1-502	11305
	R 6								
006600	POT, TRIM: RECT, 15T 50 K	3	1	00108324			BOURNS 60101649	3006P-1-503	
	R 75,81,88								
006700	RESISTOR NET, 10 PIN SIP, 5 ISOLATED 2% 10 K	3	1	05400759			BECK/HELI 60101417	765-3-R10K	
	Z 1-3								
006800	RESISTOR NET, 6 PIN SIP, 5 BUSSED 2% 100 K	1	1	05400841			BECK/HELI 60101417	763-1-R-100K	
	Z 4								
006900	CAPACITOR, MICA, DM15: 1%, 500V 100 PF	2	1	00313544			CDE 60101615	CD15FD101F03	
	C 38,43			-					
007000	CAPACITOR, MICA, DM15: 1%, 500V 150 PF	1	1	00313551			CDE 60101615	CD15FD151F03	
	C 32								
007100	CAPACITOR, MICA, DM15: 1%, 500V 200 PF	1	1	00305144			CDE 60101615	CD15FD201F03	
	C 24								
007200	CAPACITOR, MICA, DM15: 1%, 500V 300 PF	3	1	00313565			CDE 60101615	CD15FD301F03	
	C 31,45,72								
007300	CAPACITOR, MICA, DM15: 1%, 500V 330 PF	1	1	00315044			CDE 60101615	CD15FD331F03	
	C 41								
007400	CAPACITOR, MICA, DM19: 1%, 500V 750 PF	4	1	00305615			CDE 60101615	CD19FD751F03	
	C 16,18,36,47								

P A R T S L I S T

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
					PREP EHB	03/17/80
PC ASSY, PREAMP & WEIGHTING (A3) 0194C	20011771	D	D	D	CHECK EHB	07/08/80
					APRVD RHC	07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
007500	CAPACITOR, MICA, DM19: 1%, 500V	1000 PF	5	1	00313627			CDE 60101615	CD19FD102F03	
	C 15,27,34,35,46									
007600	CAPACITOR, MICA, DM19: 1%, 500V	1500 PF	4	1	00313643			CDE 60101615	CD19FD152F03	
	C 17,30,39,44									
007700	CAPACITOR, MICA, DM19: 1%, 500V	2000 PF	5	1	00313700			CDE 60101615	CD19FD202F03	
	C 19-22,29									
007800	CAPACITOR, MICA, DM19: 1%, 500V	3300 PF	1	1	00313668			CDE 60101615	CD19FD332F03	
	C 26									
007900	CAPACITOR, MICA, DM19: 1%, 500V	4700 PF	6	1	00303305			CDE 60101615	CD19FD472F03	
	C 12-14,23,37,42									
008000	CAPACITOR, DISC: +/-.5PF, 1KV, NPO	3.3 PF	2	1	00300020			SPRAGUE 60100690	10TCC-V33	
	C 7,70									
008100	CAPACITOR, DISC: +/-.5PF, 500V, NPO	10 PF	2	1	00300079			EIA STD 60107604	CC0301C0G100D501	
	C 2,3									
008200	CAPACITOR, DISC: 5%, 500V, NPO	22 PF	4	1	00305482			EIA STD 60107604	CC0391C0G220J501	
	C 4,5,11,49									
008300	CAPACITOR, DISC: 5%, 500V, NPO	33 PF	1	1	00300137			EIA STD 60107604	CC0441C0G330J501	
	C 6									
008500	CAPACITOR, DISC: 5%, 500V, NPO	47 PF	1	1	00305342			EIA STD 60107604	CC0491C0G470J501	
	C 69									
008600	CAPACITOR, DISC: 10%, 500V, X5F	1000 PF	2	1	00300376			ERIE TECH 60100310	801-000 X5F0 102K	
	C 8,10									
008700	CAPACITOR, DISC: 10%, 500V, X5F	2200 PF	1	1	00300434			EIA STD 60107604	CC0591X5F22K501	
	C 9									
008800	CAPACITOR, DISC: 20%, 500V, Z5U	.01 UF	1	1	00300459			EIA STD 60107604	CC0591Z013M501	
	C 62									
008900	CAPACITOR, RADIAL MONO: 10%, 100V, COG0	2200 PF	6	1	00302091			MURATA ER 60100310	8121-100 COG0 222K	
	C 50-55									
009000	CAPACITOR, RADIAL PE: 10%, 100V	.01 UF	1	1	00300772			SPRAGUE 60100690	225P10391M03	
	C 33									

PARTS LIST

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV	
PC ASSY, PREAMP & WEIGHTING (A3) 0194C	20011771	D	D	D	PREP EHB 03/17/80 CHECK EHB 07/08/80 APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANT	WILCOM PART/DWG	DR	IDR	SZ	IRV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
009100	CAPACITOR, RADIAL PE: 10%, 100V C 25	.022 UF	1	00302877					SPRAGUE 60100690	225P22391WD3	
009200	CAPACITOR, RADIAL PE: 10%, 100V C 40	.033 UF	1	00300798					SPRAGUE 60100690	225P33391WD3	
009300	CAPACITOR, RADIAL PE: 10%, 200V C 28	0.1 UF	1	00300616					SPRAGUE 60100690	225P10492XD3	
009400	CAPACITOR, AXIAL PE: 10%, 200V C 1	.22 UF	1	00301762					PAKTRON 60101995	224K02WC687	
009500	CAPACITOR, RADIAL MONO: 20%, 50V, Z5U C 58,61	.1 UF	2	00302190					SPRAGUE 60100690	1C25Z5U104M0508	
009600	CAPACITOR, AXIAL MPC: 1%, 150V C 56	.1 UF	1	00303131					F-DYNE 60100328	MPC11-.1-150-1	
009700	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V C 59	1.0 UF	1	00301978					ITT SEMI 60101029	TAP-A1.0K35	
009800	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V C 60	3.3 UF	1	00306787					ITT SEMI 60101029	TAP-A3.3K35	
009850	CAPACITOR, TANT ELECT: AXIAL, 10%, 20V C 73	4.7 UF	1	00301333					SPRAGUE 60100690	150D475X902082	11335
009900	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V C 48,57,63-68,71	10 UF	9	00301937					ITT SEMI 60101029	TAP-A10K35	
010000	INDUCTOR, RADIAL DIP COAT, 10% L 1,2	3.3 MH	2	04201190					CAMBION 60101771	553-3635-43-02-00	
011000	INDUCTOR, RADIAL DIP COAT, 10% L 3,4	10 MH	2	04201828					CAMBION 60101771	553-3635-49-02-00	
012000	IC, LINEAR, OP AMP, LOW NOISE, 8-PIN DIP U,8 1,8		2	00705327					SIGNETICS 60101052	NE5534AN	
013000	IC, LINEAR, DUAL LOW PWR BI-FET OP AMP U 12		1	00702050					TI SEMI 60100898	TL062CP	
014000	IC, LINEAR, OP AMP, BI-FET LOW NOISE U 5		1	00706119					TI SEMI 60100898	TL071CP	

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, PREAMP & WEIGHING (A3) 0194C

PART/DRAWING # 20011771

DWG SIZE D | DWG REV D | P/L REV D

PREP EHB 03/17/80
CHECK EHB 07/08/80
APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
0150001	IC, LINEAR, DUAL OP AMP,BI-FET LOW NOISE	2	1	00703264			TI SEMI 60100898	TL072CP	
	U 2,3								
0160001	IC, LINEAR, QUAD OP AMP, BI-FET, LOW NOISE	6	1	00705996			TI SEMI 60100898	TL074CN	
	U 4,6,7,9-11								
0170001	IC, CMOS, QUAD ANALOG TRANSMISSION GATE	1	1	00700039			SILICONIX 60100971	DG201CJ	
	U 15								
0180001	IC, LINEAR, TONE DECODER/PLL	1	1	00700179			SIGNETICS 60101052	NE567N	
	U 13								
0190001	IC, LINEAR, +5V +/-5% REG, TO-92	1	1	00703108			FCHILDSEMI 60100880	UA78L05AWC	
	U 14								
0200001	TRANSISTOR, NPN AMPLIFIER	2	1	00500868			MOTO SEMI 60100872	MPS6521	
	Q 1,2								
0210001	TRANSISTOR, PNP AMPLIFIER	1	1	00500876			MOTO SEMI 60100872	MPS6523	
	Q 3								
0220001	TRANSISTOR, NPN GP	4	1	00500074			MOTO SEMI 60100872	MPSA05	
	Q 4-7								
0230001	DIODE, SIGNAL	5	1	04000816			GE SEMI 60103405	1N4148	
	D 1-5								
0240001	DIODE, ZENER, 10V +/-10%	1	1	04000972			MOTO SEMI 60100872	1N5240	
	D 6								
0250001	RELAY, PC MOUNT 1 FORM C, 24 VDC COIL	3	1	01300425			ITT COMPON 60102233	MZ24HS	
	K 1-3								
0260001	SWITCH, ROTARY PC MOUNT: 3 DECKS, 6 POLE 5 POS	1	1	01102862	A	A	WILCOM 60000015	0194-C	
	S 1								
0270001	SWITCH, ROTARY PC MOUNT: 2 DECKS, 2 POLE 7 POS	1	1	01102854	A	A	WILCOM 60000015	0194-C	
	S 2								
0280001	MASS TERM HDR, STR (LO PRO) 10 POS	1	1	05202148			3M ELEX 60102027	3491-2002	
	J 4								
0290001	HEADER, STR POST, .100 OC 4 POS	1	1	05201652			AMP 60100062	87348-4	
	J 3								

PARTS LIST

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
					PREP EHB	03/17/80
PC ASSY, PREAMP & WEIGHTING (A3) 0194C	20011771	D	D	D	CHECK EHB	07/08/80
					APRVD RHC	07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
030000	HEADER, STR POST, .100 OC	6 POS	21	05200332			AMP 60100062	87348-6	
	J 2,5								
031000	HEADER, STR POST, .100 OC	10 POS	11	05200316			AMP 60100062	1-87348-0	
	J 1								
032000	SCHEMATIC, PREAMP & WEIGHTING CIRCUIT	REF		50007491	D	C	WILCOM 60000015	0194-C -	

******* END OF PARTS LIST *******

PARTS LIST

PREP MRB 09/13/79
CHECK EMB 03/14/80
APRVD RHC 03/14/80

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV
PC ASSY, MEASURE LEVEL SWITCHING (AA) 0194C	20011797	C	B	B

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUANIST	WILCOM PART/DWG	DR SZ	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
000100	PC BOARD, MEASURE LEVEL SWITCHING	1 1	00904227	C	A	WILCOM 60000015	0194-C		
000150	SOLDER MASK FOR 00904227, MEASURE LEVEL SWITCHING	REF 1	50007558	H	A	WILCOM 60000015	0194-CE-		
000175	RESISTOR, STABLE FILM: 1%, .25W 301 OHM R 13,17	2 1	00110007			TRW/IRC 60100781	T055	301 OHM	
000200	RESISTOR, STABLE FILM: 1%, .25W 402 OHM R 30	1 1	00110163			TRW/IRC 60100781	T055	402 OHM	
000300	RESISTOR, STABLE FILM: 1%, .25W 453 OHM R 29	1 1	00108845			TRW/IRC 60100781	T055	453 OHM	
000400	RESISTOR, STABLE FILM: 1%, .25W 511 OHM R 28	1 1	00108951			TRW/IRC 60100781	T055	511 OHM	
000500	RESISTOR, STABLE FILM: 1%, .25W 576 OHM R 27	1 1	00109033			TRW/IRC 60100781	T055	576 OHM	
000600	RESISTOR, STABLE FILM: 1%, .25W 649 OHM R 26	1 1	00109991			TRW/IRC 60100781	T055	649 OHM	
000700	RESISTOR, STABLE FILM: 1%, .25W 715 OHM R 14,18,25	3 1	00110072			TRW/IRC 60100781	T055	715 OHM	
000900	RESISTOR, STABLE FILM: 1%, .25W 806 OHM R 24	1 1	00101220			TRW/IRC 60100781	T055	806 OHM	
001000	RESISTOR, STABLE FILM: 1%, .25W 909 OHM R 23	1 1	00109108			TRW/IRC 60100781	T055	909 OHM	
001200	RESISTOR, STABLE FILM: 1%, .25W 1.02 K R 22	1 1	00109207			TRW/IRC 60100781	T055	1.02 K	
001300	RESISTOR, STABLE FILM: 1%, .25W 1.15 K R 21	1 1	00109264			TRW/IRC 60100781	T055	1.15 K	
001400	RESISTOR, STABLE FILM: 1%, .25W 3.09 K R 19	1 1	00110320			TRW/IRC 60100781	T055	3.09 K	1440
001500	RESISTOR, STABLE FILM: 1%, .25W 3.16 K R 19	1 1	00110338			TRW/IRC 60100781	T055	3.16 K	1440

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, MEASURE LEVEL SWITCHING (AA) 0194C

PART/DRAWING # 20011797

DWG SIZE: C DWG REV: B P/L REV: B

PREP MRB 09/13/79
CHECK EMB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR	SZ	RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
0015501	RESISTOR, STABLE FILM: 1%, .25W R 31	3.32 K	11	00110379				TRW/IRC 60100781	T055 3.32 K	
0016001	RESISTOR, STABLE FILM: 1%, .25W R 34	4.99 K	11	00101881				TRW/IRC 60100781	T055 4.99 K	
0017001	RESISTOR, STABLE FILM: 1%, .25W R 3,9	10.0 K	21	00102061				TRW/IRC 60100781	T055 10.0 K	
0018001	RESISTOR, STABLE FILM: 1%, .25W R 35	12.4 K	11	00102129				TRW/IRC 60100781	T055 12.4 K	
0018101	RESISTOR, STABLE FILM: 1%, .25W R 16	113 K	11	00102848				TRW/IRC 60100781	T055 113 K	1440
0018251	RESISTOR, STABLE FILM: 1%, .25W R 20	147 K	11	00111203				TRW/IRC 60100781	T055 147 K	1440
0018751	RESISTOR, STABLE FILM; 5%, .25W R 37,39	10 OHM	21	00103788				TRW/IRC 60100781	RG1/4 10 OHM	1239
0019001	RESISTOR, STABLE FILM: 5%, .25W R 5,6,11,38	150 OHM	41	00103945				TRW/IRC 60100781	RG1/4 150 OHM	1239
0019501	RESISTOR, STABLE FILM: 5%, .25W R 4,10,40	220 OHM	31	00103978				TRW/IRC 60100781	RG1/4 220 OHM	1239
0021001	RESISTOR, STABLE FILM: 5%, .25W R 2,8	680 OHM	21	00104042				TRW/IRC 60100781	RG1/4 680 OHM	
0021501	RESISTOR, STABLE FILM: 5%, .25W R 36	1 K	11	00104083				TRW/IRC 60100781	RG1/4 1 K	
0021751	RESISTOR, STABLE FILM: 5%, .25W R 12	3.9 K	11	00104208				TRW/IRC 60100781	RG1/4 3.9 K	1239
0022001	RESISTOR, STABLE FILM: 5%, .25W R 1,7	10 K	21	00104281				TRW/IRC 60100781	RG1/4 10 K	1239
0023151	CAPACITOR, DISC: 10%, 500V, X5F C 18	1000 PF	11	00300368				MURATA ER 60100310	DD61B10X5F102K500V	
0023251	CAPACITOR, DISC: 20%, 500V, Z5U C 9	.01 UF	11	00300459				EIA STD 60107604	CC0591Z013M501	

P A R T S L I S T

PREP MRB 09/13/79
CHECK EMB 03/14/80
APRVD RHC 03/14/80

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV
PC ASSY, MEASURE LEVEL SWITCHING (A4) 0194C	20011797	C	B	B

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	MILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
002400	CAPACITOR, DISC: +/-.5PF, 1KV, NPO 3.3 PF C 2,5	2	1	00300020			SPRAGUE 60100690	10TCC-V33	1239
002450	CAPACITOR, DISC: +/-.5PF, 500V, NPO 10 PF C 1A	1	1	00300079			EIA STD 60107604	CC0301C0G100D501	
002475	CAPACITOR, DISC: 5%, 500V, NPO 47 PF C 1,4	2	1	00305342			EIA STD 60107604	CC0491C0G470J501	1239
002550	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V 3.3 UF C 17	1	1	00306767			ITT SEMI 60101029	TAP-A3.3K35	
002600	CAPACITOR, TANT ELECT: DIP RAD, 20%, 10V 33 UF C 3,6,11	3	1	00301952			ITT SEMI 60101029	TAP-A33M10	1239
002650	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V 10 UF C 10,12,15,16	4	1	00301937			ITT SEMI 60101029	TAP-A10K35	1239
002900	TRANSISTOR, NPN AMPLIFIER Q 1,2,6,7	4	1	00500868			MOTO SEMI 60100872	MPS6521	1239
003000	TRANSISTOR, PNP AMPLIFIER Q 4,9	2	1	00500876			MOTO SEMI 60100872	MPS6523	1239
003100	TRANSISTOR, NPN GP Q 3,5,8,10,11	5	1	00500074			MOTO SEMI 60100872	MPSA05	1239
003200	SWITCH, ROTARY PC MOUNT: 1 DECK, 1 POLE 11 POS S 2	1	1	01102847	A	-	MILCOM 60000015	0194-C	
003300	SWITCH, ROTARY PC MOUNT: 3 DECKS, 3 POLE 10 POS S 1	1	1	01102821	A	A	MILCOM 60000015	0194-C	
003400	IC, LINEAR, HI SLEW RATE OP AMP U 1	1	1	00701029			HARRIS SEM 60100989	HA2-2515-5	
003450	IC, LINEAR, DUAL BI-FET U 2	1	1	00702043			TI SEMI 60100898	TL082CP	
003500	MASS TERM HDR, STR (LO PRO) 10 POS J 1,3	2	1	05202148			3M ELEX 60102027	3491-2002	
003600	HEADER, STR POST, .100 OC 8 POS J 2	1	1	05200290			AMP 60100062	87348-8	

PARTS LIST

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
PC ASSY, MEASURE LEVEL SWITCHING (AA) 0194C	20011797	C	B	B	PREP MRB	09/13/79
					CHECK EMB	03/14/80
					APRVD RHC	03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUANIST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
0037001	BUS WIRE, 22AWG	A/R	04800694			BELDEN 60101250	8021	
0038001	SCHEMATIC, MEASURE LEVEL SWITCHING	REF	50007566	IC	1B	WILCOM 60000015	0194-C -	

******* END OF PARTS LIST *******

PARTS LIST

PREP JMB 01/15/80
CHECK EHB 07/08/80
APRVD RHC 07/08/80

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV
PC ASSY, SEND AMPLIFIER (AS) 0194C	20012951	C	C	B

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANT	WILCOM PART/DWG	DR	SZ	REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
000100	PC BOARD, SEND AMP		1	00904219	C	B		WILCOM 60000015	0194-C	
000200	SOLDER MASK FOR 00904219, SEND AMP		REF	50007483	C	B		WILCOM 60000015	0194-C -	
000400	RESISTOR, STABLE FILM: 1%, .25W R 19	31.6 OHM	1	00108704				TRW/IRC 60100781	T055 31.6 OHM	
000500	RESISTOR, STABLE FILM: 1%, .25W R 40	49.9 OHM	1	00108795				TRW/IRC 60100781	T055 49.9 OHM	
000600	RESISTOR, STABLE FILM: 1%, .25W R 18	68.1 OHM	1	00109850				TRW/IRC 60100781	T055 68.1 OHM	
000700	RESISTOR, STABLE FILM: 1%, .25W R 17	215 OHM	1	00108944				TRW/IRC 60100781	T055 215 OHM	
000800	RESISTOR, STABLE FILM: 1%, .25W R 41	226 OHM	1	00108985				TRW/IRC 60100781	T055 226 OHM	
000900	RESISTOR, STABLE FILM: 1%, .25W R 38,39	348 OHM	2	00110064				TRW/IRC 60100781	T055 348 OHM	
001000	RESISTOR, STABLE FILM: 1%, .25W R 10	402 OHM	1	00110163				TRW/IRC 60100781	T055 402 OHM	
001100	RESISTOR, STABLE FILM: 1%, .25W R 9	453 OHM	1	00108845				TRW/IRC 60100781	T055 453 OHM	
001200	RESISTOR, STABLE FILM: 1%, .25W R 8	511 OHM	1	00108951				TRW/IRC 60100781	T055 511 OHM	
001300	RESISTOR, STABLE FILM: 1%, .25W R 42	523 OHM	1	00108977				TRW/IRC 60100781	T055 523 OHM	
001400	RESISTOR, STABLE FILM: 1%, .25W R 7	576 OHM	1	00109033				TRW/IRC 60100781	T055 576 OHM	
001500	RESISTOR, STABLE FILM: 1%, .25W R 6	649 OHM	1	00109991				TRW/IRC 60100781	T055 649 OHM	
001600	RESISTOR, STABLE FILM: 1%, .25W R 16	681 OHM	1	00110023				TRW/IRC 60100781	T055 681 OHM	

PARTS LIST

TITLE OR DESCRIPTION: PC ASSY, SEND AMPLIFIER (A5) 0190C
PART/DRAWING #: 20012951
DWG SIZE: C
DWG REV: C
P/L REV: B
PREP JMB 01/15/80
CHECK EMB 07/08/80
APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	IST	WILCOM PART/DWG	DR	DR	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
001700	RESISTOR, STABLE FILM 1%, .25W R 5	715 OHM	1	11	00110072			TRW/IRC 60100781	T055	715 OHM	
001800	RESISTOR, STABLE FILM 1%, .25W R 4	806 OHM	1	11	00101220			TRW/IRC 60100781	T055	806 OHM	
001900	RESISTOR, STABLE FILM 1%, .25W R 3	909 OHM	1	11	00109108			TRW/IRC 60100781	T055	909 OHM	
002000	RESISTOR, STABLE FILM 1%, .25W R 36,37	1.00 K	2	21	00109157			TRW/IRC 60100781	T055	1.00 K	
002100	RESISTOR, STABLE FILM 1%, .25W R 2	1.02 K	1	11	00109207			TRW/IRC 60100781	T055	1.02 K	
002200	RESISTOR, STABLE FILM 1%, .25W R 1	1.15 K	1	11	00109264			TRW/IRC 60100781	T055	1.15 K	
002300	RESISTOR, STABLE FILM 1%, .25W R 15	2.15 K	1	11	00109199			TRW/IRC 60100781	T055	2.15 K	
002400	RESISTOR, STABLE FILM 1%, .25W R 13	2.49 K	1	11	00109298			TRW/IRC 60100781	T055	2.49 K	
002450	RESISTOR, STABLE FILM 1%, .25W R 43	2.74 K	1	11	00110270			TRW/IRC 60100781	T055	2.74 K	
002500	RESISTOR, STABLE FILM 1%, .25W R 11	3.32 K	1	11	00110379			TRW/IRC 60100781	T055	3.32 K	0
002600	RESISTOR, STABLE FILM 1%, .25W R 14	6.81 K	1	11	00110726			TRW/IRC 60100781	T055	6.81 K	
002700	RESISTOR, STABLE FILM 1%, .25W R 24,25,30,31	10.0 K	4	41	00102061			TRW/IRC 60100781	T055	10.0 K	
002800	RESISTOR, STABLE FILM 1%, .25W R 44	22.1 K	1	11	00109652			TRW/IRC 60100781	T055	22.1 K	
002850	RESISTOR, STABLE FILM 1%, .25W R 47	46.4 K	1	11	00109751			TRW/IRC 60100781	T055	46.4 K	
002900	RESISTOR, STABLE FILM 1%, .25W R 12	49.9 K	1	11	00102624			TRW/IRC 60100781	T055	49.9 K	

PARTS LIST

TITLE OR DESCRIPTION: PC ASSY, SEND AMPLIFIER (A5) 0194C

PART/DRAWING #: 20012951 | DWG SIZE: C | DWG REV: C | P/L REV: B

PREP JMB 01/15/80
CHECK EMB 07/08/80
APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUANIST	WILCOM PART/DWG	DRI SIZ	DRI RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
002950	RESISTOR, STABLE FILM: 1%, .25W 100 K R 46	11	00111153			TRW/IRC 60100781	T055 100 K	
003000	RESISTOR, STABLE FILM: 5%, .25W 15 OHM R 23,35	21	00103804			TRW/IRC 60100781	RG1/4 15 OHM	
003100	RESISTOR, STABLE FILM: 5%, .25W 470 OHM R 32	11	00104018			TRW/IRC 60100781	RG1/4 470 OHM	
003150	RESISTOR, STABLE FILM: 5%, .25W 1.5 K R 22	11	00104117			TRW/IRC 60100781	RG1/4 1.5 K	
003160	RESISTOR, STABLE FILM: 5%, .25W 4.7 K R 50	11	00104216			TRW/IRC 60100781	RG1/4 4.7 K	
003175	RESISTOR, STABLE FILM: 5%, .25W 5.6 K R 45	11	00104232			TRW/IRC 60100781	RG1/4 5.6 K	1440
003200	RESISTOR, STABLE FILM: 5%, .25W 10 K R 20,48,49,53	41	00104281			TRW/IRC 60100781	RG1/4 10 K	
003250	RESISTOR, STABLE FILM: 5%, .25W 47 K R 51,52	21	00104406			TRW/IRC 60100781	RG1/4 47 K	
003300	RESISTOR, STABLE FILM: 5%, .25W 100 K R 33	11	00104463			TRW/IRC 60100781	RG1/4 100 K	
003350	POT, TRIM: RECT, 15T 1 K R 21	11	00108027			BOURNS 60101649	3006P-1-102	
003400	POT, TRIM: RECT, 15T 50 K R 34	11	00108328			BOURNS 60101649	3006P-1-503	
003450	CAPACITOR, MICA, DM15: 2%, 500V 43 PF C 12	11	00315101			CDE 60101615	CD15FD430G03	1422
003500	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V 10 UF C 1,2,4,9,10	51	00301937			ITT SEMI 60101029	TAP-A10X35	
003550	CAPACITOR, DISC: 10%, 500V, X5F 200 PF C 11	11	00300244			EIA STD 60107604	CC0301X5F201K501-DFF	
003600	CAPACITOR, DISC: 10%, 500V, X5F 1000 PF C 6,7	21	00300368			MURATA ER 60100310	DD61B10X5F102K500V	

PARTS LIST

TITLE OR DESCRIPTION: PC ASSY, SEND AMPLIFIER (A5) 0194C

PART/DRAWING #: 20012951 | DWG SIZE: C | DWG REV: C | P/L REV: B

PREP JMB 01/15/80 | CHECK EMB 07/08/80 | APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUANIST	WILCOM PART/DWG	DRIOR SIZ	DRIOR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
003650	CAPACITOR, RADIAL MONO: 20%, 50V, Z5U .1 UF C 10	11	00302190			SPRAGUE 60100690	1C25Z5U104M0508	11440
003700	CAPACITOR, ALUM ELECTS AXIAL, 40V 220 UF C 3	11	00301556			SIEMENS 60100658	B 41283-A7227-T	
003750	CAPACITOR, CERAMIC (LEADS .25 OC) SEL C 5,8	21	00305789			NOTE 60103975	VALUE DET AT TEST	
003800	IC, LINEAR, BI-FET OP AMP, 8-PIN DIP U 1	11	00701813			TI SEMI 60100898	TL081CP	
003850	IC, LINEAR, DUAL BI-FET U 2	11	00702043			TI SEMI 60100898	TL082CP	
003900	IC, CMOS: ANALOG SWITCH, DUAL SPDT U 3	11	00706002			SILICONIX 60100971	DG303CJ	
004000	IC, LINEAR, OP AMP, LOW NOISE, 8-PIN DIP U 4,5	21	00705327			SIGNETICS 60101052	NE5534AN	
004050	TRANSISTOR, PNP GP Q 1	11	00500017			MOTO SEMI 60100872	MPSA55	
004100	SWITCH, ROTARY PC MOUNT, 2 DECKS, 4 POLE 3 POS S 3	11	01102797	A	-	WILCOM 60000015	0194-C	
004200	SWITCH, ROTARY PC MOUNT: 1 DECK, 1 POLE 7 POS S 2	11	01102839	A	A	WILCOM 60000015	0194-C	
004300	SWITCH, ROTARY PC MOUNT, 1 DECK, 1 POLE 11 POS S 1	11	01103340	A	-	WILCOM 60000015	0194-C -	
004400	HEADER, STR POST, .100 OC 8 POS J 3	11	05200290			AMP 60100062	87348-8	
004500	HEADER, STR POST, .100 OC 6 POS J 2	11	05201652			AMP 60100062	87348-6	
004550	HEADER, STR POST, .100 OC 10 POS J 6	11	05200316			AMP 60100062	1-87348-0	
004600	MASS TERM MOR, STR (LO PRO) 10 POS J 1	11	05202148			3M ELEX 60102027	3491-2002	

P A R T S L I S T

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV	
PC ASSY, SEND AMPLIFIER (A5) 0194C	20012951	C	C	B	PREP JMB 01/15/80 CHECK EHB 07/08/80 APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUANT	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
0047001	BUS WIRE, 22AWG	A/R	04800694			BELDEN 60101250	8021	
0048001	SCHEMATIC, SEND AMPLIFIER A5	REF	50008440	IC	18	WILCOM 60000015	0194-C -	

******* END OF PARTS LIST *******

PARTS LIST

TITLE OR DESCRIPTION: PC ASSEMBLY, OSCILLATOR (A6) 0194C

PART/DRAWING #: 20012852 | DWG SIZE: C | DWG REV: - | P/L REV: -

PREP JMB 01/15/80
CHECK EMB 07/08/80
APRVD RMC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	IST	WILCOM PART/DWG	DR	ID	SZ	IRV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
0001001	PC BOARD, OSCILLATOR		1	11	00904193	IC	-			WILCOM 60000015	0194-C	
0002001	SOLDER MASK FOR 00904193, OSCILLATOR		REF		50007467	IC	-			WILCOM 60000015	0194-C -	
0003001	BRACKET, OSCILLATOR ASSY		1	11	04611328	IB	-			WILCOM 60000015	0194-C	
0004001	RESISTOR, STABLE FILM 1%, .25W R 6,14	909 OHM	2	21	00109108					TRW/IRC 60100781	T055 909 OHM	
0005001	RESISTOR, STABLE FILM 1%, .25W R 5,12,13,21,27,28,33,34,35	10.0 K	9	91	00102061					TRW/IRC 60100781	T055 10.0 K	
0006001	RESISTOR, STABLE FILM 1%, .25W R 16	11.3 K	1	11	00109538					TRW/IRC 60100781	T055 11.3 K	
0007001	RESISTOR, STABLE FILM 1%, .25W R 1	12.1 K	1	11	00110577					TRW/IRC 60100781	T055 12.1 K	
0008001	RESISTOR, STABLE FILM 1%, .25W R 25,26,32	20.0 K	3	31	00109603					TRW/IRC 60100781	T055 20.0 K	
0009001	RESISTOR, STABLE FILM 1%, .25W R 31	27.4 K	1	11	00110825					TRW/IRC 60100781	T055 27.4 K	
0010001	RESISTOR, STABLE FILM 1%, .25W R 18	30.1 K	1	11	00110866					TRW/IRC 60100781	T055 30.1 K	
0011001	RESISTOR, STABLE FILM 1%, .25W R 2	33.2 K	1	11	00110957					TRW/IRC 60100781	T055 33.2 K	
0012001	RESISTOR, STABLE FILM 1%, .25W R 20	78.7 K	1	11	00111112					TRW/IRC 60100781	T055 78.7 K	
0013001	RESISTOR, STABLE FILM 1%, .25W R 3	80.6 K	1	11	00102806					TRW/IRC 60100781	T055 84.5 K	
0014001	POT, TRIM 3/8 SQ E/A, 18T R 15	2 K	1	11	00114041					BECK/HELI 60101417	68XR2K	
0015001	POT, TRIM 3/8 SQ E/A, 18T R 17,30	5 K	2	21	00113829					BECK/HELI 60101417	68XR5K	

PARTS LIST

TITLE OR DESCRIPTION

PC ASSEMBLY, OSCILLATOR (46) 0194C

PART/DRAWING # 20012652 | DWG SIZE C | DWG REV - | P/L REV -

PREP JMB 01/15/80
CHECK EMB 07/08/80
APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	IST	WILCOM PART/DWG	DR	SZ	RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
001600	POT, CTRL: 5/8 SQ, 1T DUAL 10 K R 44,48		11		00108563				BOURNS 60101649	81A2AB28A15/A15	
001700	POT, TRIM: 3/8 SQ E/A, 18T 10 K R 19		11		00114173				BECK/HELI 60101417	68XR10K	
001800	RESISTOR, STABLE FILM: 5%, .25W R 11	3.3 K	11		00104182				TRW/IRC 60100781	RG1/4 3.3 K	
001900	RESISTOR, STABLE FILM: 5%, .25W R 10	10 K	11		00104281				TRW/IRC 60100781	RG1/4 10 K	
002000	RESISTOR, STABLE FILM: 5%, .25W R 29	33 K	11		00104372				TRW/IRC 60100781	RG1/4 33 K	
002200	RESISTOR, STABLE FILM: 5%, .25W R 7,22	2.7 MEG	21		00115352				TRW/IRC 60100781	RG1/4 2.7 MEG	
002300	RESISTOR, STABLE FILM: 5%, .25W R 9,24	3.3 MEG	21		00113175				TRW/IRC 60100781	RG1/4 3.3 MEG	
002400	RESISTOR, STABLE FILM: 5%, .25W R 8,23	4.7 MEG	21		00113068				TRW/IRC 60100781	RG1/4 4.7 MEG	
002500	CAPACITOR, DISC: +/-.5PF, 1KV, NPO C 1,6	3.3 PF	21		00300020				SPRAGUE 60100690	10TCC-V33	
002600	CAPACITOR, MICA, DM15: 5%, 500V C 5,10	43 PF	21		00313866				CDE 60101615	CD15ED430J03	
002700	CAPACITOR, RADIAL PE: 10%, 100V C 8,9	.047 UF	21		00300814				SPRAGUE 60100690	225P47391WD3	
002800	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V C 12,13	3.3 UF	21		00306787				ITT SEMI 60101029	TAP-A3.3K35	
002900	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V C 14-17	10 UF	41		00301937				ITT SEMI 60101029	TAP-A10K35	
003000	CAPACITOR, TANT ELECT: DIP RAD, 20%, 10V C 11	33 UF	11		00301952				ITT SEMI 60101029	TAP-A33M10	
003100	CAPACITOR, MICA, DM15: 5%, 500V C 2,7	430 PF	21		00313965				CDE 60101615	CD15FD431J03	

PARTS LIST

TITLE OR DESCRIPTION: PC ASSEMBLY, OSCILLATOR (A6) 0194C

PART/DRAWING #: 20012852 | DWG SIZE: C | DWG REV: - | P/L REV: -

PREP JMB 01/15/80
CHECK EMB 07/08/80
APRVD RMC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUANT	ST	WILCOM PART/DWG	DR	SZ	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
003200	CAPACITOR, MICA, DM19 15, 500V 4700 PF C 3,8	2	1	00303305				COE 60101615	CD19FD472F03	
003300	IC, LINEAR, HI SLEW RATE OP AMP U 1,2,3,4,5	5	1	00701029				HARRIS SEM 60100989	HA2-2515-5	
003400	IC, LINEAR, LOW DRIFT 2.5V REFERENCE U 6	1	1	00705764				ANALOG DEV 60103363	AD580JH	
003500	DIODE, SIGNAL D 1,2	2	1	04000816				GE SEMI 60103405	1N4148	
003600	TRANSISTOR, NPN AMPLIFIER Q 1	1	1	00500868				MOTO SEMI 60100872	MP86521	
003700	TRANSISTOR, N-CHAN J-FET SWITCH Q 2	1	1	00501361				SILICONIX 60100971	J113-18	
003800	SWITCH, ROTARY PC MOUNT 4 DECKS, 4 POLE 7 POS S 1	1	1	01102870	A	A		WILCOM 60000015	0194-C	
003900	MASS TERM HDR, STR (LO PRO) 10 POS J 1	1	1	05202148				3M ELEX 60102027	3491-2002	
004000	BRACKET, TUNING POT	1	1	04411351	A	-		WILCOM 60000015	0194-C	
004100	MS, PHILLIPS, PAN HD 4-40 X .250	4	1	04402041	R	-		WILCOM 60000015	S P 4-40X.250	
004200	LOCKWASHER, HELICAL SPRING #4	4	1	04600599	R	-		WILCOM 60000015	W H 4	
004400	DRIVE, REVERSE VERNIER	1	1	05001284	A	-		WILCOM 60000015	0194-00-146	
004600	MS, PHILLIPS, PAN HD 6-32 X .250	3	1	04602124	R	-		WILCOM 60000015	S P 6-32X.250	
004700	LOCKWASHER, HELICAL SPRING #6	3	1	04600821	R	-		WILCOM 60000015	W H 6	
004800	SCHEMATIC, OSCILLATOR	REF		50008432	C	-		WILCOM 60000015	0194-C -	

END OF PARTS LIST

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, METER CIRCUIT (A7) 0194C

PART/DRAWING # 20011821 | DWG SIZE B | DWG REV A | P/L REV A

PREP RLF 09/12/79
CHECK EHB 07/08/80
APRVD RHC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANIST	WILCOM PART/DWG	DRI SZ	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
000100	PC BOARD, METER CIRCUIT		1 1	00904185	B	-	WILCOM 60000015	0194-C	
000200	SOLDER MASK FOR 00904185, METER CIRCUIT		REF	50007442	C	-	WILCOM 60000015	0194-CF-	
000300	RESISTOR, TC, +3500 PPM/DEG C, 1% RT 1	1.00 K	1 1	00114017			TEL LABS 60100765	981	
000400	RESISTOR, STABLE FILM: 1%, .25W R 1A	3.01 K	1 1	00110296			TRW/IRC 60100781	T055 3.01 K	
000500	RESISTOR, STABLE FILM: 1%, .25W R 17	4.99 K	1 1	00101881			TRW/IRC 60100781	T055 4.99 K	
000600	RESISTOR, STABLE FILM: 1%, .25W R 2	5.49 K	1 1	00110627			TRW/IRC 60100781	T055 5.49 K	
000700	RESISTOR, STABLE FILM: 1%, .25W R 13,22,23,24,28	10.0 K	5 1	00102061			TRW/IRC 60100781	T055 10.0 K	
000900	RESISTOR, STABLE FILM: 1%, .25W R 6	16.2 K	1 1	00110718			TRW/IRC 60100781	T055 16.2 K	
001000	RESISTOR, STABLE FILM: 1%, .25W R 21	20.0 K	1 1	00109603			TRW/IRC 60100781	T055 20.0 K	
001200	RESISTOR, STABLE FILM: 1%, .25W R 15	24.9 K	1 1	00109744			TRW/IRC 60100781	T055 24.9 K	
001300	RESISTOR, STABLE FILM: 1%, .25W R 34	40.2 K	1 1	00109686			TRW/IRC 60100781	T055 40.2 K	
001400	RESISTOR, STABLE FILM: 1%, .25W R 10	44.2 K	1 1	00102574			TRW/IRC 60100781	T055 44.2 K	
001500	RESISTOR, STABLE FILM: 1%, .25W R 12,14	49.9 K	2 1	00102624			TRW/IRC 60100781	T055 49.9 K	
001600	RESISTOR, STABLE FILM: 1%, .25W R 27	100 K	1 1	00111153			TRW/IRC 60100781	T055 100 K	
001700	POT, TRIM: 3/8 SQ E/4, 18T R 1,30	5 K	2 1	00113829			BECK/HELI 60101417	68XR5K	

PARTS LIST

TITLE OR DESCRIPTION

PREP RLF 09/12/79
CHECK EMB 07/08/80
APRVD RMC 07/08/80

PC ASSY, METER CIRCUIT (A7) 0196C	PART/DRAWING # 20011821	DWG SIZE B	DWG REV A	P/L REV A

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANIST	WILCOM PART/DWG	DR	DR SZ	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
001800	POT, TRIM: 3/8 SQ E/A, 18T R 5	20 K	1 1	00114181				BECK/HELI 60101417	68XR20K	
001900	POT, TRIM: 3/8 SQ E/A, 18T R 9,35	50 K	2 1	00114199				BECK/HELI 60101417	68XR50K	
002000	RESISTOR, STABLE FILM: 5%, .25W R 29	1 K	1 1	00104083				TRW/IRC 60100781	RG1/4 1 K	
002100	RESISTOR, STABLE FILM: 5%, .25W R 11	2.2 K	1 1	00104141				TRW/IRC 60100781	RG1/4 2.2 K	
002200	RESISTOR, STABLE FILM: 5%, .25W R 20,25,26	4.7 K	3 1	00104216				TRW/IRC 60100781	RG1/4 4.7 K	
002300	RESISTOR, STABLE FILM: 5%, .25W R 31	7.5 K	1 1	00104265				TRW/IRC 60100781	RG1/4 7.5 K	
002400	RESISTOR, STABLE FILM: 5%, .25W R 19,32	10 K	2 1	00104281				TRW/IRC 60100781	RG1/4 10 K	
002500	RESISTOR, STABLE FILM: 5%, .25W R 3,4,7,8,16,33	100 K	6 1	00104463				TRW/IRC 60100781	RG1/4 100 K	
002600	CAPACITOR, TANT ELECTR DIP RAD, 10%, 35V C 1,2,5,9,14,15	10 UF	6 1	00301937				ITT SEMI 60101029	TAP-A10K35	
002700	CAPACITOR, TANT ELECTR AXIAL, 10%, 20V C 3	1.0 UF	1 1	00301309				SPRAGUE 60100690	150D105X902042	
002800	CAPACITOR, DISC: 5%, 500V, NT50 C 6,7	100 PF	2 1	00300210				EIA STD 60107604	CC0491U2J101J501	
002900	CAPACITOR, AXIAL MPC: 5%, 200V C 10	1.0 UF	1 1	00303883				MESCO 60103330	32 MPC 1004 J-2	
003000	CAPACITOR, DISC: 20%, 500V, Z5U C 8	.01 UF	1 1	00300459				EIA STD 60107604	CC0591Z013M501	
003100	CAPACITOR, DISC: +/-.25PF, 500V, NPO C 4	5 PF	1 1	00300061				MURATA ER 60100310	DD57B10NP05W0C500V	
003200	CAPACITOR, DISC: 10%, 500V, X5F C 11	1000 PF	1 1	00300376				ERIE TECH 60100310	801-000 X5F0 102M	

PARTS LIST

TITLE OR DESCRIPTION: PC ASSY, METER CIRCUIT (A7) 0194C

PART/DRAWING #: 20011821 | DWG SIZE: B | DWG REV: A | P/L REV: A

PREP RLF 09/12/79
CHECK EMB 07/08/80
APRVD RMC 07/08/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANIST	WILCOM PART/DWG	DRI SZ	DRI RV	SOURCE INFORMATION: MFR NAME/NO.	MFR PART NO.	ECO NO.
003300	CAPACITOR, RADIAL MONO: 20%, 100V, Z5U	.1 UF	11	00315283			MURATA ER 60100310	8131-100-Z5U 104M	11530
	C 12								
003400	CAPACITOR, TANT ELECTR AXIAL, 10%, 20V	2.2 UF	11	00301317			SPRAGUE 60100690	150D225X9020A2	
	C 13								
003500	TRANSISTOR, N-CHAN J-FET SWITCH		21	00500157			SILICONIX 60100971	J106-18	
	Q 1,2								
003600	TRANSISTOR, DUAL NPN		11	00500389			MOTO SEMI 60100872	2N2919	
	Q 3								
003700	TRANSISTOR, NPN GP		11	00500074			MOTO SEMI 60100872	MPSA05	
	Q 4								
003800	DIODE, SIGNAL		21	04000816			GE SEMI 60103405	1N4148	
	D 3,4								
003900	DIODE, SHOTTKY BARRIER		21	04001103			H.P. 60100393	5082-2800	
	D 1,2								
004000	IC, LINEAR, TRUE RMS TO DC CONVERTER		11	00705756			ANALOG DEV 60103363	AD536AJD	
	U 1								
004100	IC, LINEAR, DUAL OP AMP, BI-FET LOW NOISE		21	00703264			TI SEMI 60100898	TL072CP	
	U 3,4								
004200	IC, LINEAR, LOW DRIFT 2.5V REFERENCE		11	00705764			ANALOG DEV 60103363	AD580JH	
	U 7								
004300	IC, LINEAR, OP AMP, LOW NOISE, 8-PIN DIP		11	00705327			SIGNETICS 60101052	NE5534AN	
	U 2								
004400	IC, LINEAR, BI-FET OP AMP, 8-PIN DIP		11	00701813			TI SEMI 60100898	TL081CP	
	U 5								
004500	IC, CMOS, DUAL RETRIGGERABLE MONO		11	00701821			MOTO SEMI 60100872	MC14538BCP	
	U 6								
004510	MASS TERM HDR, STR (LO PRO) 10 POS		21	05202148			3M ELEX 60102027	3491-2002	
	J 1,2								
004520	HEADER, STR POST, .100 OC	4 POS	21	05201652			AMP 60100062	87348-4	
	J 3,4								

PARTS LIST

TITLE OR DESCRIPTION | PART/DRAWING # | DWG SIZE | DWG REV | P/L REV | PREP RLF 09/12/79 | CHECK EMB 07/08/80 | APRVD RMC 07/08/80

PC ASSY, METER CIRCUIT (A7) 0194C | 20011821 | B | A | A

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUANIST	WILCOM PART/DWG	ISZ	DR	IRV	SOURCE INFORMATION: MFR NAME/NO.	MFR PART NO.	ECO NO.
0005301	BUS WIRE, 22AWG	A/R	04800694				BELDEN 60101250	8021	
0046001	SCHEMATIC, METER CIRCUIT	REF	50007434	C	A		WILCOM 60000015	0194-C	

END OF PARTS LIST

PARTS LIST

TITLE OR DESCRIPTION: PC ASSY, FREQUENCY METER (A8) 0194C

PART/DRAWING #: 20011654 | DWG SIZE: C | DWG REV: A | P/L REV: B

PREP SPT 02/14/80
CHECK EHB 03/14/80
APRVD RMC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	IST	WILCOM PART/DWG	DR	SZ	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
000100	PC BOARD, FREQUENCY METER		1	1	00904201	C	A		WILCOM 60000015	0194-C	
000200	SOLDER MASK FOR 00904201, FREQUENCY METER		REF	1	50007418	C	A		WILCOM 60000015	0194-C -	
000300	RESISTOR, STABLE FILM: 1%, .25W R 1-4,6	10.0 K	5	1	00102061				TRW/IRC 60100781	T055 10.0 K	
000400	RESISTOR, STABLE FILM: 5%, .25W R 8	1 K	1	1	00104083				TRW/IRC 60100781	RG1/4 1 K	
000500	RESISTOR, STABLE FILM: 5%, .25W R 7,9-11,12	10 K	5	1	00104281				TRW/IRC 60100781	RG1/4 10 K	1239
000600	RESISTOR, STABLE FILM: 5%, .25W R 5	33 K	1	1	00104372				TRW/IRC 60100781	RG1/4 33 K	
000800	CAPACITOR, DISC: +/-.5PF, 500V, NPO C 3	10 PF	1	1	00300079				EIA STD 60107604	CC0301C0G100D501	
000900	CAPACITOR, DISC: 5%, 500V, NPO C 2	15 PF	1	1	00305466				EIA STD 60107604	CC0391C0G150J501	
001000	CAPACITOR, DISC: 10%, 500V, X5F C 6	150 PF	1	1	00300236				EIA STD 60107604	CC0301X5F151K501	
001100	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V C 1,4,5,7-9	10 UF	6	1	00301937				ITT SEMI 60101029	TAP-A10K35	
001300	IC, CMOS, DECADE COUNTER U 1		1	1	00701201				RCA SEMI 60101144	CD40178E	
001400	IC, CMOS, QUAD D FLIP-FLOP U 2		1	1	00702142				MOTO SEMI 60100872	MC14175BCP	
001500	IC, CMOS, HEX GATE, VARIOUS FUNCTIONS U 3		1	1	00702274				MOTO SEMI 60100872	MC14572UBCP	
001600	IC, CMOS, DUAL D FLIP-FLOP U 4		1	1	00704858				RCA SEMI 60101144	CD4013BE	
001700	IC, CMOS, DUAL 4-STAGE STATIC SHIFT REG U 5		1	1	00702191				RCA SEMI 60101144	CD4015BE	

PARTS LIST

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV	
PC ASSY, FREQUENCY METER (A8) 0194C	20011654	C	A	B	PREP SPT 02/14/80 CHECK EMB 03/14/80 APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	IST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
001800	IC, CMOS, QUAD 2-INPUT AND GATE U 6,9	21		00701375			RCA SEMI 60101144	CD4081BE	
001900	IC, CMOS, QUAD 2-INPUT OR GATE U 7	11		00701342			RCA SEMI 60101144	CD4071BE	
002000	IC, CMOS, DUAL J-K FLIP-FLOP U 8	11		00702712			RCA SEMI 60101144	CD4027BE	
002100	IC, LINEAR, BI-MOS OP AMP (8 PIN DIP) U 10	11		00702985			RCA SEMI 60101144	CA3130E	
002200	IC, CMOS, PHASE-LOCKED LOOP U 11	11		00701318			RCA SEMI 60101144	CD4046BE	
002300	IC, CMOS, PRESETTABLE DIV-BY-N COUNTER U 12,13,14	31		00701219			RCA SEMI 60101144	CD4018BE	
002400	IC, CMOS, DUAL BCD UP COUNTER U 15,16,17	31		00701490			MOTO SEMI 60100872	MC14518BCP	
002500	IC, COMS, QUAD R/S LATCH, 3-STATE U 18,19	21		00704940			RCA SEMI 60101144	CD4043BE	
002600	IC, CMOS, 8-INPUT NOR/OR GATE U 20	11		00702811			RCA SEMI 60101144	CD4078BE	
002700	IC, CMOS, BCD-TO-7 SEGMENT LATCH/DECODER/DRIVER U 21-25	51		00701532			MOTO SEMI 60100872	MC14543BCP	1467
002800	IC, CMOS, QUAD X-OR GATE U 26	11		00702100			RCA SEMI 60101144	CD4070BE	
002900	IC, CMOS, QUAD AND GATE U 27	11		00705798			RCA SEMI 60101144	CD4073BE	
003100	BRACKET, FREQUENCY METER	11		04611344	A	A	WILCOM 60000015	0194-C	
003200	MS, PHILLIPS, PAN HD 6-32 X .250	21		04602124	R	-	WILCOM 60000015	S P 6-32X.250	
003300	LOCKWASHER, HELICAL SPRING #6	21		04600821	R	-	WILCOM 60000015	H H 6	

PARTS LIST

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV	
PC ASSY, FREQUENCY METER (A8) 0194C	20011854	C	A	B	PREP SPT 02/14/80 CHECK EMB 03/14/80 APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION. REFERENCE DESIGNATION	QUANIST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
003400	MASS TERM HDR, RTA 10 POS	1 1	05202734			3M ELEX 60102027	3491-1002	
003450	HEADER, RT ANGLE, .150 OC DBL ROW 10 POS	4 1	05200274			AMP 60100062	86415-1	
003500	SCHEMATIC, FREQUENCY METER	REF 1	50007400	D	A	WILCOM 60000015	0194-C -	

END OF PARTS LIST

P A R T S L I S T

TITLE OR DESCRIPTION: PC ASSEMBLY, READOUT (A9) 0194C

PART/DRAWING #: 20011862 | DWG SIZE: B | DWG REV: A | P/L REV: - | PREP SPT 02/20/80 | CHECK EHB 03/14/80 | APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUANIST	WILCOM PART/DWG	DR SIZE	DR REV	SOURCE INFORMATION: MFR NAME/NO.	MFR PART NO.	ECO NO.
0001001	PC BOARD, READOUT BOARD	1	00904177	B	B	WILCOM 60000015	0194-C	
0002001	SOLDER MASK FOR 00900177, READOUT BOARD	REF	50007392	B	A	WILCOM 60000015	0194-C -	
0003001	DSPLY, LCD: .5H, .125PINS +/-6 DIG DS 1	1	01700210			CRYSTALOID 60102274	K5560-51 (W/.125 PINS)	
0004001	SOCKET, IC: STRIP, PC TERM 32 POS	2	05202932			SAMTEC 60105202	SSA-132-S-T	
0005001	SCHEMATIC, FREQUENCY METER	REF	50007400	D	A	WILCOM 60000015	0194-C -	

******* END OF PARTS LIST *******

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, IMPULSE TIMER (A10) 0194C

PART/DRAWING # 20011870

DWG SIZE: C | DWG REV: B | P/L REV: A

PREP SPI 02/14/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANIST	WILCOM PART/DWG	DR SZ	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
000100	PC BOARD, IMPULSE TIMER		1 1	00906169	B	A	WILCOM \ 60000015	0194-C	
000200	SOLDER MASK FOR 00906169, IMPULSE TIMER		REF	50007376	B	A	WILCOM 60000015	0194-C -	
000300	RESISTOR, STABLE FILM: 5%, .25W R 2	1 MEG	1 1	00113142			TRW/IRC 60100781	RG1/4 1 MEG	
000400	RESISTOR, STABLE FILM: 5%, .25W R 10,11,12	1 K	3 1	00104083			TRW/IRC 60100781	RG1/4 1 K	
000500	RESISTOR, STABLE FILM: 5%, .25W R 3-9,14,19	10 K	9 1	00104281			TRW/IRC 60100781	RG1/4 10 K	11239
000600	RESISTOR, STABLE FILM: 5%, .25W R 1	15 K	1 1	00104315			TRW/IRC 60100781	RG1/4 15 K	
000650	RESISTOR, STABLE FILM: 5%, .25W R 20,21	22 K	2 1	00104349			TRW/IRC 60100781	RG1/4 22 K	11239
000700	RESISTOR, STABLE FILM: 5%, .25W R 15	47 K	1 1	00104406			TRW/IRC 60100781	RG1/4 47 K	
000750	RESISTOR, STABLE FILM: 5%, .25W R 13,17,18	220 K	3 1	00104505			TRW/IRC 60100781	RG1/4 220 K	
000800	RESISTOR, STABLE FILM: 5%, .25W R 16	470 K	1 1	00104547			TRW/IRC 60100781	RG1/4 470 K	
001300	DIODE, SIGNAL D 1,2,3,4		4 1	04000816			GE SEMI 60103405	1N4148	
001400	LED, RED POINT SOURCE, T 1-3/4 CYL DS 1,2		2 1	04001004			MONSANTO 60100948	MV5053	
001500	TRANSISTOR, NPN GP Q 1		1 1	00500074			MOTO SEMI 60100872	MPSA05	
001600	TRANSISTOR, PNP GP Q 2,3		2 1	00500017			MOTO SEMI 60100872	MPSA55	11239
001900	CAPACITOR, DISC: 5%, 500V, N750 C 1,2	22 PF	2 1	00300111			TUSONIX 60107364	831-000-U2J0-220J	

PARTS LIST

TITLE OR DESCRIPTION: PC ASSY, IMPULSE TIMER (A10) 0193C

PART/DRAWING #: 20011870 | DWG SIZE: C | DWG REV: B | P/L REV: A

PREP SPT 02/14/80 | CHECK EMB 03/14/80 | APRVD RHC 03/14/80

LINE NUMBER	REFERENCE DESIGNATION	TITLE OR DESCRIPTION	QUANT	ST	WILCOM PART/DWG	DR	SZ	RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
001950	C 7	CAPACITOR, DISC: 10%, 500V, X5F 1000 PF	1	1	00300376				ERIE TECH 60100310	801-000 X5F0 102K	
002000	C 3	CAPACITOR, DISC: 20%, 500V, Z5U .01 UF	1	1	00300459				EIA STD 60107608	CC0591Z013M501	
002100	C 4,5	CAPACITOR, TANT ELECTR DIP RAD, 20%, 35V 6.8 UF	2	1	00301960				ITT SEMI 60101029	TAP-A6.8K35	
002200	C 6,8	CAPACITOR, TANT ELECTR DIP RAD, 10%, 35V 10 UF	2	1	00301937				ITT SEMI 60101029	TAP-A10K35	
002300	U 1	IC, CMOS, PRESETTABLE DIV-BY-N COUNTER	1	1	00701219				RCA SEMI 60101144	CD4018BE	
002600	U 2	IC, CMOS, PRESETTABLE UP/DOWN COUNTER	1	1	00704926				RCA SEMI 60101144	CD4029BE	
002500	U 3,6	IC, CMOS, DUAL D FLIP-FLOP	2	1	00704858				RCA SEMI 60101140	CD4013BE	
002600	U 4,5	IC, CMOS, DUAL BCD UP COUNTER	2	1	00701490				MOTO SEMI 60100872	MC14518BCP	
002700	U 7	IC, CMOS, QUAD AND GATE	1	1	00705798				RCA SEMI 60101144	CD4073BE	
002800	U 8	IC, CMOS, QUAD EXCLUSIVE NOR GATE	1	1	00705814				RCA SEMI 60101144	CD4077BE	
002900	U 9	IC, CMOS, QUAD 2-INPUT NAND GATE	1	1	00704544				RCA SEMI 60101144	CD4011BE	
003000	U 10	IC, CMOS, OSC/14 STAGE BINARY COUNTER	1	1	00701334				RCA SEMI 60101144	CD4060BE	
003100	Y 1	XTAL, +/-.005% @ 25 DEG C, PAR 15PF, 3.2768 MHZ	1	1	05800692				ERIE FREQ 60103508	E327, MC-33	
003200	S 1	SWITCH, ROTARY PC MOUNT: 1 DECK, 2 POLE 9 POS	1	1	01102813	A	1C		WILCOM 60000015	0194-C	
003300	S 2	SWITCH, ROTARY PC MOUNT, 1 DECK, 2 POLE 3 POS	1	1	01102805	A	1-		WILCOM 60000015	0194-C	

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, IMPULSE TIMER (A10) 0194C

PART/DRAWING # 20011870 | DWG SIZE C | DWG REV B | P/L REV A

PREP SPT 02/14/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	IST	WILCOM PART/DWG	DR	SZ	DR REV	SOURCE INFORMATION: MFR NAME/NO.	MFR PART NO.	ECO NO.
003400	HEADER, RT ANGLE, .150 OC DBL ROW 10 POS	2		05200274				AMP 60100062	86415-1	
003500	BRACKET, IMPULSE BOARD	1		04411336	A		-	WILCOM 60000015	0194-C	
003600	LOCKWASHER, HELICAL SPRING #4	2		04600599	R		-	WILCOM 60000015	W H 4	
003700	MS, PHILLIPS, PAN HD 4-40 X .250	2		04602041	R		-	WILCOM 60000015	S P 4-40X.250	
003800	SCHEMATIC, IMPULSE TIMER	REF		50007368	D		B	WILCOM 60000015	0194-C -	
003900	SCHEMATIC, CAROT	REF		50008481	D		-	WILCOM 60000015	032A- -	

******* END OF PARTS LIST *******

P A R T S L I S T

TITLE OR DESCRIPTION: POWER SUPPLY TRAY ASSY (A11) 0194C

PART/DRAWING #: 20011888 | DWG SIZE: C | DWG REV: A | P/L REV: A

PREP SPT 01/24/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DW SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
000100	TRAY, POWER SUPPLY	1	1	04411864	C	A	WILCOM 60000015	0194-C	
000200	PC ASSY, POWER SUPPLY (A12) A 12	1	1	20011896	C	D	WILCOM 60000015	0194-C -	
000300	BATTERY, NI-CAD: 9.6 V, 2.0 AH BT 1,2	2	1	05020193			SAFT 60104940	B16515-8	
000400	TRANSFORMER, POWER T 1	1	1	04201844	B	-	WILCOM 60000015	0194-C	
000500	OUTPUT TRANSFORMER (7538) T 2	1	1	04201786	A	-	WILCOM 60000015	0194-C	
000600	HOUSING, .156 OC LOCKING 6 POS P 2	1	1	05200134			MOLEX 60101847	09-50-3061	
000700	HOUSING, .156 OC LOCKING 8 POS P 1	1	1	05202866			MOLEX 60101847	09-50-3041	
000750	CONTACT, FEMALE, TIN PL, 18-24 AWG (.100 MAX OD)	10	1	05202163			MOLEX 60101847	08-50-0106	
000800	CONNECTOR, RECEPTACLE W/EARS 8 POS	1	1	05202858			MOLEX 60101847	03-06-1081	
000850	CONTACT, FEMALE, TIN PL, 18-24	8	1	05202726			MOLEX 60101847	02-06-1103	1239
000900	HOUSING, CABLE MOUNT 6 POS P 3	1	1	05200779			AMP 60100062	1-480270-0	
000950	CONTACT, FEMALE, 18-24 AWG	6	1	05200985			AMP 60100062	60617-4	
001000	BRACKET, FUSE HOLDER	1	1	04411989	A	-	WILCOM 60000015	0194-C	
001100	FUSE HOLDER (1-1/4X1/4), BLK ROUND XF 1	1	1	05000427			BUSSMAN 60101557	HTA	
001200	FUSE, NORM (1/4X1-1/4) 2 A F 1	1	1	05000351			LITTLEFUSE 60101565	312002	

PARTS LIST

TITLE OR DESCRIPTION: POWER SUPPLY TRAY ASSY (All) 0194C

PART/DRAWING #: 20011888 | DWG SIZE: C | DWG REV: A | P/L REV: A

PREP SPT 01/24/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	IST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
0013001	WIRE, HOOKUP 18AWG (19X30)	BLK	A/R		04800298			ALPHA 60101284	1857/19 BLK	
0014001	WIRE, HOOKUP 18AWG (19X30)	RED	A/R		04800264			ALPHA 60101284	1857/19 RED	
0014201	WIRE, HOOKUP 22AWG UL 1015	BLK	A/R		04801114			ALPHA 60101284	3071 BLK	
0014401	WIRE, HOOKUP 22AWG UL 1015	BRN	A/R		04801122			ALPHA 60101284	3071 BRN	
0015001	WIRE, HOOKUP 22AWG UL 1015	GRN/YEL	A/R		04801155			ALPHA 60101284	3071 GRN/YEL	
0015501	TUBING, HEAT SHRINK, 1/2 DIA	YEL	1		04800223			ALPHA 60101284	FIT 221-1/2" YEL	
0016001	MS, PHILLIPS, PAN HD	4-40 X .250	6		04602041	R	-	WILCOM 60000015	S P 4-40X.250	
0016501	MS, PHILLIPS, PAN HD	4-40 X .375	4		04602066	R	-	WILCOM 60000015	S P 4-40X.375	
0017001	MS, PHILLIPS, PAN HD	6-32 X .375	4		04602140	R	-	WILCOM 60000015	S P 6-32X.375	
0018001	MS, PHILLIPS, PAN HD	6-32 X 2.250	4		04603106	R	-	WILCOM 60000015	S P 6-32X2.250	
0019001	WASHER, FLAT (1/2 OD, 1/32 THICK)	#6	4		04603072	R	-	FED SCREW 60500170	97419	
0020001	LOCKWASHER, HELICAL SPRING	#4	10		04600599	R	-	WILCOM 60000015	W H #4	
0022001	LOCKWASHER, HELICAL SPRING	#6	8		04600821	R	-	WILCOM 60000015	W H #6	11239

******* END OF PARTS LIST *******

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, POWER SUPPLY (A12) 0194C

PART/DRAWING # 20011896 | DWG SIZE C | DWG REV D | P/L REV B

PREP SPT 09/24/79
CHECK EMB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANT	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
000100	PC BOARD, POWER SUPPLY		1	00904235	C	C	WILCOM 60000015	0194-C	
000200	SOLDER MASK FOR 00904235, POWER SUPPLY		REF	50007830	C	A	WILCOM 60000015	0194-C -	
000300	RESISTOR, WIREWOUND 5%, .75W R 8	2.7 OHM	1	00114777			TRW/IRC 60100781	BW-20 2.70HM (5%)	
000400	RESISTOR, STABLE FILM 1%, .25W R 18	82.5 OHM	1	00109983			TRW/IRC 60100781	T055 82.5 OHM	
000500	RESISTOR, STABLE FILM 1%, .25W R 2	100 OHM	1	00100578			TRW/IRC 60100781	T055 100 OHM	
000600	RESISTOR, STABLE FILM 1%, .25W R 3	1.00 K	1	00109157			TRW/IRC 60100781	T055 1.00 K	
000700	RESISTOR, STABLE FILM 1%, .25W R 8	4.99 K	1	00101881			TRW/IRC 60100781	T055 4.99 K	
000800	RESISTOR, STABLE FILM 1%, .25W R 13	5.62 K	1	00110643			TRW/IRC 60100781	T055 5.62 K	
000900	RESISTOR, STABLE FILM 1%, .25W R 10,11	10.0 K	2	00102061			TRW/IRC 60100781	T055 10.0 K	
001000	RESISTOR, STABLE FILM 1%, .25W R 15	24.9 K	1	00109744			TRW/IRC 60100781	T055 24.9 K	
001100	RESISTOR, STABLE FILM 5%, .25W R 9,26,28	1 K	3	00104083			TRW/IRC 60100781	RG1/4 1 K	1440
001200	RESISTOR, STABLE FILM 5%, .25W R 20,24	1.5 K	2	00104117			TRW/IRC 60100781	RG1/4 1.5 K	
001300	RESISTOR, STABLE FILM 5%, .25W R 21,22	3.3 K	2	00104182			TRW/IRC 60100781	RG1/4 3.3 K	
001400	RESISTOR, STABLE FILM 5%, .25W R 5,6	4.7 K	2	00104216			TRW/IRC 60100781	RG1/4 4.7 K	
001500	RESISTOR, STABLE FILM 5%, .25W R 7,19,23	10 K	3	00104281			TRW/IRC 60100781	RG1/4 10 K	1440

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, POWER SUPPLY (A12) 0194C

PART/DRAWING # 20011896 | DWG SIZE C | DWG REV D | P/L REV B

PREP SPT 09/24/79
CHECK EMB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	IST	WILCOM PART/DWG	ORI	DRI	SZ	RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
0016001	RESISTOR, STABLE FILM: 5%, .25W R 1	15 K	1	1	00104315					TRW/IRC 60100781	RG1/4 15 K	
0017001	RESISTOR, STABLE FILM: 5%, .25W R 16,17	100 K	2	1	00104463					TRW/IRC 60100781	RG1/4 100 K	1440
0018001	RESISTOR, STABLE FILM: 5%, .25W R 28	2.2 MEG	1	1	00113035					TRW/IRC 60100781	RG1/4 2.2 MEG	1440
0018501	RESISTOR, WIREWOUND: 5%, 3W R 25	7.5 OHM	1	1	00112599					OHMITE 60101599	23J7R5	
0019001	POT, TRIM: 3/8 SQ T/A, 18T R 12	2 K	1	1	00114397					BECK/HELI 60101417	68WR2K	
0019501	CAPACITOR, ALUM ELECT: AXIAL, 63V C 2	1000 UF	1	1	00301564					SIEMENS 60100658	B 41010-B8108-T	
0020001	CAPACITOR, DISC: 10%, 500V, X5F C 1	1000 PF	1	1	00300376					ERIE TECH 60100310	801-000 X5F0 102K	
0021001	DIODE, RECTIFIER, 1A D 1,2,3		3	1	04000824					MOTO SEMI 60100872	1N4005	
0021501	DIODE, SIGNAL D 4		1	1	04000816					GE SEMI 60103405	1N4148	1440
0022001	TRANSISTOR, NPN HIGH VOLTAGE Q 1		1	1	00500082					MOTO SEMI 60100872	MPSA42	
0023001	TRANSISTOR, PNP AMPLIFIER Q 2,3		2	1	00500876					MOTO SEMI 60100872	MPS6523	
0024001	TRANSISTOR, NPN GP Q 4,7,11		3	1	00500074					MOTO SEMI 60100872	MPSA05	
0025001	TRANSISTOR, PNP GP Q 5,8		2	1	00500017					MOTO SEMI 60100872	MPSA55	
0026001	TRANSISTOR, PNP POWER Q 6		1	1	00500322					MOTO SEMI 60100872	MJE371	
0027001	TRANSISTOR, NPN POWER Q 9		1	1	00500348					MOTO SEMI 60100872	MJE521	

PARTS LIST

TITLE OR DESCRIPTION: PC ASSY, POWER SUPPLY (A12) 0194C

PART/DRAWING #: 20011896 | DWG SIZE: C | DWG REV: D | P/L REV: B

PREP SPT 09/24/79
CHECK EMB 03/14/80
APRVD RMC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANTITY	WILCOM PART/DWG	DRIDR SIZE	DRIDR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
002800	TRANSISTOR, NPN POWER Q 10		11	00500108			TI SEMI 60100898	TIP51	
002900	HEADER, STR POST, .156 OC W/LOCK J 1,4	6 POS	21	05200167			MOLEX 60101847	09-65-1061	
003000	HEADER, STR POST, .156 OC W/LOCK J 3	4 POS	11	05200142			MOLEX 60101847	09-65-1041	
003100	HEADER, STR POST, .100 OC J 2	16 POS	11	05201827			AMP 60100062	1-87388-4	
003200	IC, LINEAR, DUAL LOW PWR BI-FET OP AMP U 1		11	00702050			TI SEMI 60100898	TL062CP	
003300	IC, LINEAR, LOW DRIFT 2.5V REFERENCE U 2		11	00705764			ANALOG DEV 60103363	AD580JH	
003400	BUS WIRE, 18AWG		A/R	04800678			BELDEN 60101250	8019	
003500	BRACKET, P.C. BOARD, HEAT SINK		11	04407367	A	-	WILCOM 60000015	0273-01-145	
003600	MS, PHILLIPS, PAN HD	4-40 X .250	11	04602041	R	-	WILCOM 60000015	S P 4-40X.250	
003650	MS, NYLON SLOTTED, PAN HD	6-32 X .312	11	04601969	R	-	WILCOM 60000015	S S 6-32X.312	
003700	LOCKWASHER, HELICAL SPRING	#4	11	04600599	R	-	WILCOM 60000015	W H 4	
003800	NUT, HEX, 1/4 AF	4-40	11	04600581	R	-	WILCOM 60000015	N H 4-40	
003820	NUT, HEX, NYLON, 5/16 AF	6-32	11	04602975			H H SMITH 60101300	2555	
003900	INSULATOR, THERM COND ELASTOMER	TIP-36	11	05003603			CHOMERICS 60103470	60-11-5792-1674	
004000	SCHEMATIC, POWER SUPPLY		REF	50007848	C	10	WILCOM 60000015	0194-C -	

******* END OF PARTS LIST *******

P A R T S L I S T

TITLE OR DESCRIPTION: FRONT PANEL ASSY (A1) 0194CE — PART/DRAWING #: 20011755 — DWG SIZE: D — DWG REV: A — P/L REV: A

PREP JMB 01/31/80
CHECK SPT 03/19/80
APRVD DFF 03/20/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SZ	UR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
000100	PANEL	1	1	04411948	C	B	WILCOM 60000015	0194-CE	
000200	MADE-FROM	****							
000300	PANEL DETAIL	REF	1	04411955	C	A	WILCOM 60000015	0194-CE	
000400	PC ASSY, HOLD & LINE SWITCHING (A2)	1	1	20011763	C	C	WILCOM 60000015	0194-C -	
000500	PREAMP & WEIGHTING ASSEMBLY	1	1	20012746	C	A	WILCOM 60000015	0194-CE-	
000600	MEASURE LEVEL & SEND AMP ASSEMBLY (PART OF A1)	1	1	20012753	C	-	WILCOM 60000015	0194-CE-	
000700	PC ASSEMBLY, OSCILLATOR (A6)	1	1	20011813	C	A	WILCOM 60000015	0194-CE-	
000800	PC ASSY, METER CIRCUIT (A7)	1	1	20011839	B	A	WILCOM 60000015	0194-CE-	
000900	METER	1	1	01500636	B	-	WILCOM 60000015	0194-C	
001000	WIRED SWITCH ASSY, METER CIRCUIT (PART OF A1)	1	1	20013058	B	A	WILCOM 60000015	0194-CE-	
001100	TIME AND COUNT ASSY (PART OF A1)	1	1	20011847	B	-	WILCOM 60000015	0194-C -	
001200	POWER SUPPLY TRAY ASSY (A11)	1	1	20011888	C	A	WILCOM 60000015	0194-C -	
001300	CONNECTOR & SWITCH ASSY, AC LINE (230V)	1	1	20013264	B	B	WILCOM 60000015	0194-CE-	1239
001400	WIRED SWITCH ASSY, PULL ON (PART OF A1)	1	1	20012878	A	A	WILCOM 60000015	0194-C -	
001500	JACK, PHONE: 3 COND (DAL OPEN CKT) J 1	1	1	05201587			SWCRAFT 60100732	128	

P A R T S L I S T

TITLE OR DESCRIPTION

	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
*FRONT PANEL ASSY (A1) 0194CE	20011755	D	A	A	PREP JMB	01/31/80
					CHECK SPT	03/19/80
					APRVD DFF	03/20/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
001510	WIRED SWITCH ASSY, NOTCH FILTER	(PART OF A1)	1	1	20012936	B	A	WILCOM 60000015	0194-C -	
001520	WIRED SWITCH ASSY, BRDG/TERM	(PART OF A1)	1	1	20012944	A	A	WILCOM 60000015	0194-C -	
001525	HARNESS ASSY, MAIN	(W1)	1	1	20012902	C	A	WILCOM 60000015	0194-C -	
001540	WIRED CONTROL ASSY, VERNIER LEVEL	(PART OF A1)	1	1	20012886	A	A	WILCOM 60000015	0194-C -	
001550	CABLE ASSY, RIBBON W 2,3	(W2,3)	2	1	20012910	A	-	WILCOM 60000015	0194-C -	
001560	CABLE ASSY, RIBBON W 4,5	(W4,5)	2	1	20012928	A	-	WILCOM 60000015	0194-C -	
001600	BINDING POST, BLACK		3	1	05201462			GRAYHILL 60101151	29-1 BLK	
001700	BINDING POST, RED		6	1	05201454			GRAYHILL 60101151	29-1 RED	
001800	JACK, EUROPEAN TRIPLE BANANA J 2,3		2	1	05201215			POMONA 60101268	4163-0	
001900	DIAL POST		2	1	05017702	A	-	WILCOM 60000015	0132-10-132	
002000	DIAL POST WASHER		1	1	04600185	A	-	WILCOM 60000015	0051-00-142	
002050	BUSHING, SHOULDER	#6	2	1	05017710			KEYSTONE 60100468	3054	
002100	BRACKET		3	1	04411757	C	-	WILCOM 60000015	0194-C	
002150	LED HOLDER, BLACK: T-1-3/4 CYLINDRICAL		4	1	05000815			MONSANTO 60100948	MP52	
002200	KNOB, BLK: 1/2 DIA W/BAR	1/4 BUSH	10	1	05001623			BUCKEYE 60100153	PS-50BL-2-BLK	

P A R T S L I S T

TITLE OR DESCRIPTION

FRONT PANEL ASSY (A1) 0194CE

PART/DRAWING # 20011755

DWG SIZE	D
DWG REV	A
P/L REV	A
PREP JMB	01/31/80
CHECK SPT	03/19/80
APRVD DFF	03/20/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
002250	KNOB, BLK: 31/32 DIA	1/4 BUSH	1	1	05001714			BUCKEYE 60100153	PS-95-2-BLK	
002300	HANDLE, 4" OC MTG (DISCARD SCREWS PROVIDED)		2	1	05000575			BUDRADIO 60101532	H-9111B	
002310	HOUSING, .100 OC LOCKING P 1-3	4 POS	3	1	05201751			AMP 60100062	1-87175-0	
002320	CONTACT, LOCKING, 22-26 AWG		8	1	05201843			AMP 60100062	87124-2	
002330	KEYING DEVICE		3	1	05201835			AMP 60100062	87179-1	
002340	PANEL WINDOW		1	1	04412615	A	-	WILCOM 60000015	0194-C -	11239
002350	CONTACT CEMENT		A/R	1	05800693			ROBERTS 60105269	#0104	11239
002360	GROMMET, CONTINUOUS		2	1	05003736			RICHCO PLA 60103314	SNGS-2	11239
002400	MS, PHILLIPS, PAN HD	4-40 X .312	6	1	04602058	R	-	WILCOM 60000015	S P 4-40X.312	11239
002450	MS, PHILLIPS, PAN HD	4-40 X .375	2	1	04602066	R	-	WILCOM 60000015	S P 4-40X.375	
002475	MS, PHILLIPS, PAN HD	4-40 X .500	2	1	04602082	R	-	WILCOM 60000015	S P 4-40X.500	11239
002500	MS, PHILLIPS, PAN HD	6-32 X .312	10	1	04602132	R	-	WILCOM 60000015	S P 6-32X.312	
002550	MS, PHILLIPS, FLAT HD	6-32 X .312	8	1	04602504	R	-	WILCOM 60000015	S F 6-32X.312	11239
002600	MS, PHILLIPS, PAN HD	10-32 X .500	4	1	04602371	R	-	WILCOM 60000015	S P 10-32X.500	
002700	WASHER, FLAT, NYLON (THIN)	#8	4	1	04600136			AMATOM 60100039	2202-N116	

PARTS LIST

TITLE OR DESCRIPTION: * FRONT PANEL ASSY (A1) 0194CE *

PART/DRAWING #: 20011755

DWG SIZE: D | DWG REV: A | P/L REV: A

PREP JMB 01/31/80
CHECK SPT 03/19/80
APRVD DFF 03/20/80

LINE NUMBER	TITLE OR DESCRIPTION REFERENCE DESIGNATION		QUANIST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
002725	WASHER, FLAT	#2	2	04602819	R	-	WILCOM 60000015	W F 2	1239
002750	LOCKWASHER, HELICAL SPRING	#4	8	04600599	R	-	WILCOM 60000015	W H 4	1239
002780	LOCKWASHER, HELICAL SPRING	#10	4	04601290	R	-	WILCOM 60000015	W H 10	
002800	WASHER, FLAT, NYLON (THIN)	#6	12	04600128			AMATOM 60100039	2203-N129	1239
002850	NUT, HEX, 1/4 AF	4-40	4	04600581	R	-	WILCOM 60000015	N H 4-40	1239
002865	NUT, HEX, 1/4 AF (SPECIAL)	6-32	4	04600805	R	-	WILCOM 60000015	N S 6-32	
002875	SOLDER LUG (FOR #6 FASTENER)		2	05019781			H H SMITH 60101300	1414-6	
002900	SOLDER LUG (FOR #10 FASTENER)		9	05017231			H H SMITH 60101300	1414-10	
003000	WIRE, HOOKUP 22AWG (7X30)	BRN	A/R	04600348			BELDEN 60101250	8503 BRN	
003100	WIRE, HOOKUP 22AWG (7X30)	YEL	A/R	04600322			BELDEN 60101250	8503 YEL	
003200	WIRE, HOOKUP 22AWG (7X30)	GRN	A/R	04600405			BELDEN 60101250	8503 GRN	
003300	WIRE, HOOKUP 22AWG (7X30)	WHT	A/R	04600355			BELDEN 60101250	8503 WHT	

******* END OF PARTS LIST *******

P A R T S L I S T

TITLE OR DESCRIPTION

PC ASSY, PREAMP & WEIGHTING (A3) 0194CE

PART/DRAWING # 20011784 | DWG SIZE D | DWG REV C | P/L REV E

PREP RHC 01/10/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
0001001	PC BOARD, WEIGHTING CIRCUIT		1	1	00904730	D	B	WILCOM 60000015	0194-CE		
0002001	SOLDER MASK FOR 00904730, WEIGHTING CIRCUIT		REF	1	50007509	D	B	WILCOM 60000015	0194-CE-		
0004001	RESISTOR, STABLE FILM: 1%, .25W R 1,2	75.0 OHM	2	1	00109942			TRW/IRC 60100781	T055	75.0 OHM	
0005001	RESISTOR, STABLE FILM: 1%, .25W R 104	294 OHM	1	1	00114009			TRW/IRC 60100781	T055	294 OHM	
0006001	RESISTOR, STABLE FILM: 1%, .25W R 13	316 OHM	1	1	00110015			TRW/IRC 60100781	T055	316 OHM	
0007001	RESISTOR, STABLE FILM: 1%, .25W R 103	453 OHM	1	1	00108845			TRW/IRC 60100781	T055	453 OHM	
0009001	RESISTOR, STABLE FILM: 1%, .25W R 11	750 OHM	1	1	00110114			TRW/IRC 60100781	T055	750 OHM	
0009501	RESISTOR, STABLE FILM: 1%, .25W R 105	1.00 K	1	1	00109157			TRW/IRC 60100781	T055	1.00 K	1336
0010001	RESISTOR, STABLE FILM: 1%, .25W R 5	1.05 K	1	1	00109215			TRW/IRC 60100781	T055	1.05 K	1239
0011001	RESISTOR, STABLE FILM: 1%, .25W R 70	2.15 K	1	1	00109199			TRW/IRC 60100781	T055	2.15 K	
0012001	RESISTOR, STABLE FILM: 1%, .25W R 20,21	2.49 K	2	1	00109298			TRW/IRC 60100781	T055	2.49 K	
0013001	RESISTOR, STABLE FILM: 1%, .25W R 39	3.01 K	1	1	00110296			TRW/IRC 60100781	T055	3.01 K	
0013501	RESISTOR, STABLE FILM: 1%, .25W R 10	3.32 K	1	1	00110379			TRW/IRC 60100781	T055	3.32 K	
0014001	RESISTOR, STABLE FILM: 1%, .25W R 63	4.99 K	1	1	00101881			TRW/IRC 60100781	T055	4.99 K	
0015001	RESISTOR, STABLE FILM: 1%, .25W R 22,65	5.11 K	2	1	00110585			TRW/IRC 60100781	T055	5.11 K	

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, PREAMP & WEIGHTING (A3) 0194CE

PART/DRAWING # 20011789

DWG SIZE: D

DWG REV: C

P/L REV: E

PREP RHC 01/10/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
001600	RESISTOR, STABLE FILM: 1%, .25W R 67	6.19 K	1	1	00114504			TRW/IRC 60100781	T055	6.19 K	
001700	RESISTOR, STABLE FILM: 1%, .25W R 64	6.04 K	1	1	00110668			TRW/IRC 60100781	T055	6.04 K	
001800	RESISTOR, STABLE FILM: 1%, .25W R 26,27	7.50 K	2	1	00109322			TRW/IRC 60100781	T055	7.50K	
001900	RESISTOR, STABLE FILM: 1%, .25W R 59,60	8.25 K	2	1	00109389			TRW/IRC 60100781	T055	8.25 K	
002000	RESISTOR, STABLE FILM: 1%, .25W R 71,83	9.76 K	2	1	00109447			TRW/IRC 60100781	T055	9.76 K	
002100	RESISTOR, STABLE FILM: 1%, .25W R 15,51	10.0 K	2	1	00102061			TRW/IRC 60100781	T055	10.0 K	
002200	RESISTOR, STABLE FILM: 1%, .25W R 48,49,50	10.2 K	3	1	00102079			TRW/IRC 60100781	T055	10.2 K	
002300	RESISTOR, STABLE FILM: 1%, .25W R 95	12.4 K	1	1	00102129			TRW/IRC 60100781	T055	12.4 K	
002400	RESISTOR, STABLE FILM: 1%, .25W R 68	10.7 K	1	1	00114736			TRW/IRC 60100781	T055	10.7 K	
002500	RESISTOR, STABLE FILM: 1%, .25W R 57	11.3 K	1	1	00109538			TRW/IRC 60100781	T055	11.3 K	
002600	RESISTOR, STABLE FILM: 1%, .25W R 54,66	11.5 K	2	1	00110551			TRW/IRC 60100781	T055	11.5 K	
002700	RESISTOR, STABLE FILM: 1%, .25W R 58	11.8 K	1	1	00113571			TRW/IRC 60100781	T055	11.8 K	
002800	RESISTOR, STABLE FILM: 1%, .25W R 37	12.1 K	1	1	00110577			TRW/IRC 60100781	T055	12.1 K	
002900	RESISTOR, STABLE FILM: 1%, .25W R 55,56	13.3 K	2	1	00110619			TRW/IRC 60100781	T055	13.3 K	
003000	RESISTOR, STABLE FILM: 1%, .25W R 62	13.7 K	1	1	00102152			TRW/IRC 60100781	T055	13.7 K	

P A R T S L I S T

TITLE OR DESCRIPTION: PC ASSY, PREAMP & WEIGHTING (A3) 0194CE

PART/DRAWING #: 20011789 | DWG SIZE: D | DWG REV: C | P/L REV: E

PREP RHC 01/10/80 | CHECK EHB 03/14/80 | APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
003100	RESISTOR, STABLE FILM: 1%, .25W	17.4 K	1	1	00102236			TRW/IRC 60100781	T055	17.4 K	
	R 90										
003200	RESISTOR, STABLE FILM: 1%, .25W	20.0 K	1	1	00109603			TRW/IRC 60100781	T055	20.0 K	
	R 33										
003300	RESISTOR, STABLE FILM: 1%, .25W	22.1 K	1	1	00109652			TRW/IRC 60100781	T055	22.1 K	
	R 48										
003400	RESISTOR, STABLE FILM: 1%, .25W	30.1 K	2	1	00110866			TRW/IRC 60100781	T055	30.1 K	
	R 24,42										
003500	RESISTOR, STABLE FILM: 1%, .25W	34.8 K	1	1	00109561			TRW/IRC 60100781	T055	34.8 K	
	R 46										
003600	RESISTOR, STABLE FILM: 1%, .25W	36.5 K	1	1	00109546			TRW/IRC 60100781	T055	36.5 K	
	R 34										
003700	RESISTOR, STABLE FILM: 1%, .25W	43.2 K	2	1	00109702			TRW/IRC 60100781	T055	43.2 K	11352
	R 40,41										
003800	RESISTOR, STABLE FILM: 1%, .25W	51.1 K	1	1	00110817			TRW/IRC 60100781	T055	51.1 K	
	R 8										
003900	RESISTOR, STABLE FILM: 1%, .25W	49.9 K	5	1	00102624			TRW/IRC 60100781	T055	49.9 K	
	R 28,29,74,80,87										
004000	RESISTOR, STABLE FILM: 1%, .25W	53.6 K	1	1	00102657			TRW/IRC 60100781	T055	53.6 K	
	R 43										
004100	RESISTOR, STABLE FILM: 1%, .25W	60.4 K	1	1	00102699			TRW/IRC 60100781	T055	60.4 K	
	R 45										
004200	RESISTOR, STABLE FILM: 1%, .25W	69.8 K	1	1	00110940			TRW/IRC 60100781	T055	69.8 K	
	R 53										
004300	RESISTOR, STABLE FILM: 1%, .25W	100 K	2	1	00111153			TRW/IRC 60100781	T055	100 K	
	R 9,23										
004400	RESISTOR, STABLE FILM: 1%, .25W	107 K	1	1	00113639			TRW/IRC 60100781	T055	107 K	
	R 61										
004500	RESISTOR, STABLE FILM: 1%, .25W	110 K	3	1	00111005			TRW/IRC 60100781	T055	110 K	
	R 77,84,91										

PARTS LIST

TITLE OR DESCRIPTION

* PC ASSY, PREAMP & WEIGHTING (43) 0194CE *

PART/DRAWING # 20011789 | DWG SIZE D | DWG REV C | P/L REV E

PREP RHC 01/10/80
CHECK EMB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANIST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
0046001	RESISTOR, STABLE FILM: 1%, .25W R 30,31,32	113 K	3	00102848			TRW/IRC 60100781	T055 113 K	
0047001	RESISTOR, STABLE FILM: 1%, .25W R 47	115 K	1	00114793			TRW/IRC 60100781	T055 115 K	
0048001	RESISTOR, STABLE FILM: 1%, .25W R 35	121 K	1	00111179			TRW/IRC 60100781	T055 121 K	
0049001	RESISTOR, STABLE FILM: 1%, .25W R 3,4	200 K	2	00111260			TRW/IRC 60100781	T055 200 K	
0050001	RESISTOR, STABLE FILM: 1%, .25W R 36	365 K	1	00111419			TRW/IRC 60100781	T055 365 K	
0051001	RESISTOR, STABLE FILM: 1%, .25W R 72	374 K	1	00111427			TRW/IRC 60100781	T055 374 K	
0052001	RESISTOR, STABLE FILM: 1%, .25W R 78,85	499 K	2	00111500			TRW/IRC 60100781	T055 499 K	
0053001	RESISTOR, STABLE FILM: 1%, .25W R 73,76	750 K	2	00111575			TRW/IRC 60100781	T055 750 K	
0054001	RESISTOR, STABLE FILM: 1%, .25W R 79,82,86,89	1.00 MEG	4	00111617			TRW/IRC 60100781	T055 1.00 MEG	
0055001	RESISTOR, STABLE FILM: 1%, .25W R 25	1.10 MEG	1	00114785			TRW/IRC 60100781	T055 1.10 MEG	
0056001	RESISTOR, STABLE FILM: 5%, .25W R 16,18	150 OHM	2	00103945			TRW/IRC 60100781	RG1/4 150 OHM	
0057001	RESISTOR, STABLE FILM: 5%, .25W R 14	220 OHM	1	00103978			TRW/IRC 60100781	RG1/4 220 OHM	
0058001	RESISTOR, STABLE FILM: 5%, .25W R 19	470 OHM	1	00104018			TRW/IRC 60100781	RG1/4 470 OHM	
0059001	RESISTOR, STABLE FILM: 5%, .25W R 12	680 OHM	1	00104042			TRW/IRC 60100781	RG1/4 680 OHM	
0060001	RESISTOR, STABLE FILM: 5%, .25W R 99	1 K	1	00104083			TRW/IRC 60100781	RG1/4 1 K	

P A R T S L I S T

TITLE OR DESCRIPTION: PC ASSY, PREAMP & WEIGHTING (A3) 0194CE

PART/DRAWING #: 20011789 | DWG SIZE: D | DWG REV: C | P/L REV: E

PREP RHC 01/10/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
006100	RESISTOR, STABLE FILM: 5%, .25W	6.8 K	11		00104257			TRW/IRC	RG1/4 6.8 K	
5	R 7							60100781		
006200	RESISTOR, STABLE FILM: 5%, .25W	7.5 K	11		00104265			TRW/IRC	RG1/4 7.5 K	
6	R 17							60100781		
006300	RESISTOR, STABLE FILM: 5%, .25W	10 K	41		00104281			TRW/IRC	RG1/4 10 K	
7	R 92,94,100,101							60100781		
006400	RESISTOR, STABLE FILM: 5%, .25W	22 K	11		00104349			TRW/IRC	RG1/4 22 K	
8	R 97							60100781		
006450	RESISTOR, STABLE FILM: 5%, .25W	43 K	11		00104398			TRW/IRC	RG1/4 43 K	1536
9	R 93							60100781		
006500	RESISTOR, STABLE FILM: 5%, .25W	68 K	11		00104430			TRW/IRC	RG1/4 68 K	
10	R 98							60100781		
006650	RESISTOR, STABLE FILM: 5%, .25W	1 MEG	11		00113142			TRW/IRC	RG1/4 1 MEG	
11	R 96							60100781		
006700	RESISTOR, STABLE FILM: 1%, 4W	3.32 K	11		00107532			TRW/IRC	G83 3.32 K	
12	R 102							60100781		
006800	POT, TRIM: RECT, 15T	5 K	11		00108092			BOURNS	3006P-1-502	1305
13	R 6							60101649		
006900	POT, TRIM: 3/8 SQ E/A, 18T	5 K	21		00113629			BECK/HELI	68XR5K	
14	R 38,52							60101417		
007000	POT, TRIM: RECT, 15T	50 K	31		00108324			BOURNS	3006P-1-503	
15	R 75,81,88							60101649		
007100	RESISTOR NET, 10 PIN SIP, 5 ISOLATED 2%	10 K	31		05400759			BECK/HELI	765-3-R10K	
16	Z 1,2,3							60101417		
007200	RESISTOR NET, 6 PIN SIP, 5 BUSSED 2%	100 K	11		05400841			BECK/HELI	763-1-R-100K	
17	Z 4							60101417		
007300	CAPACITOR, MICA, DM15: 1%, 500V	100 PF	11		00313544			CDE	CD15FD101F03	
18	C 43							60101615		
007400	CAPACITOR, MICA, DM15: 1%, 500V	150 PF	11		00313551			CDE	CD15FD151F03	
19	C 32							60101615		

PARTS LIST

TITLE OR DESCRIPTION

PART/DRAWING # 20011789

DWG SIZE: D | DWG REV: C | P/L REV: E

PREP RHC 01/10/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

PC ASSY, PREAMP & WEIGHTING (A3) 0194CE

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR	IOR	SZ	IRV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
007500	CAPACITOR, MICA, DM15: 1%, 500V	300 PF	1	1	00313585					CDE 60101615	CD15FD301F03	
	C 45											
007600	CAPACITOR, MICA, DM15: 1%, 500V	330 PF	1	1	00315044					CDE 60101615	CD15FD331F03	
	C 41											
007700	CAPACITOR, MICA, DM15: 1%, 500V	470 PF	2	1	00313601					CDE 60101615	CD15FD471F03	
	C 27,35											
007800	CAPACITOR, MICA, DM19: 1%, 500V	750 PF	3	1	00305615					CDE 60101615	CD19FD751F03	
	C 16,18,47											
007900	CAPACITOR, MICA, DM19: 1%, 500V	1000 PF	6	1	00313627					CDE 60101615	CD19FD102F03	
	C 15,24,25,29,37,46											
008000	CAPACITOR, MICA, DM19: 1%, 500V	1500 PF	3	1	00313643					CDE 60101615	CD19FD152F03	
	C 17,30,44											
008100	CAPACITOR, MICA, DM19: 1%, 500V	2000 PF	9	1	00313700					CDE 60101615	CD19FD202F03	
	C 19,20,21,22,28,33,36,38,39											
008200	CAPACITOR, RADIAL MONO: 10%, 100V, COGO	2200 PF	6	1	00302091					MURATA ER 60100310	8121-100 COGO 222K	
	C 50,51,52,53,54,55											
008300	CAPACITOR, MICA, DM19: 1%, 500V	3300 PF	1	1	00313668					CDE 60101615	CD19FD332F03	
	C 34											
008400	CAPACITOR, MICA, DM19: 1%, 500V	4700 PF	6	1	00303305					CDE 60101615	CD19FD472F03	
	C 12,13,14,26,31,42											
008500	CAPACITOR, DISC: +/-.5PF, 1KV, NPO	3.3 PF	2	1	00300020					SPRAGUE 60100690	10TCC-V33	
	C 7,70											
008600	CAPACITOR, DISC: +/-.5PF, 500V, NPO	10 PF	2	1	00300079					EIA STD 60107604	CC0301C0G1000501	
	C 2,3											
008700	CAPACITOR, DISC: 5%, 500V, NPO	22 PF	4	1	00305482					EIA STD 60107604	CC0391C0G220J501	11239
	C 4,5,11,49											
008800	CAPACITOR, DISC: 5%, 500V, NPO	33 PF	1	1	00300137					EIA STD 60107604	CC0441C0G330J501	
	C 6											
008900	CAPACITOR, DISC: 5%, 500V, NPO	47 PF	1	1	00305342					EIA STD 60107604	CC0491C0G470J501	
	C 69											

P A R T S L I S T

TITLE OR DESCRIPTION

PC ASSY, PREAMP K WEIGHTING (A3) 0194CE

PART/DRAWING # 20011789

DWG SIZE: D | DWG REV: C | P/L REV: E

PREP RHC 01/10/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SIZE	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
009000	CAPACITOR, DISC: 10%, 500V, X5F	1000 PF	2	1	00300376			ERIE TECH 60100310	801-000 X5F0 102K	
	C 8,10									
009100	CAPACITOR, DISC: 10%, 500V, X5F	2200 PF	1	1	00300434			EIA STD 60107604	CC0591X5F22K501	
	C 9									
009200	CAPACITOR, DISC: 20%, 500V, Z5U	.01 UF	1	1	00300459			EIA STD 60107604	CC0591Z013M501	
	C 62									
009300	CAPACITOR, RADIAL PE: 10%, 100V	.033 UF	1	1	00300798			SPRAGUE 60100690	225P33391WD3	
	C 40									
009400	CAPACITOR, AXIAL PE: 10%, 200V	.22 UF	1	1	00301762			PAKTRON 60101995	224K02WC687	1239
	C 1									
009500	CAPACITOR, RADIAL PE: 10%, 200V	0.1 UF	1	1	00300616			SPRAGUE 60100690	225P10492XD3	
	C 23									
009600	CAPACITOR, RADIAL MONO: 20%, 100V, Z5U	.1 UF	2	1	00315283			MURATA ER 60100310	8131-100-Z5U 104M	1530
	C 58,61									
009700	CAPACITOR, AXIAL MPC: 1%, 150V	.1 UF	1	1	00303131			F-DYNE 60100328	MPC11-.1-150-1	
	C 56									
009800	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V	1.0 UF	1	1	00301978			ITT SEMI 60101029	TAP-A1.0K35	
	C 59									
009900	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V	3.3 UF	1	1	00306787			ITT SEMI 60101029	TAP-A3.3K35	
	C 60									
009950	CAPACITOR, TANT ELECT: AXIAL, 10%, 20V	4.7 UF	1	1	00301333			SPRAGUE 60100690	150D475X902082	1336
	C 72									
010000	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V	10 UF	9	1	00301937			ITT SEMI 60101029	TAP-A10K35	
	C 48,57,63-68,71									
010100	INDUCTOR, RADIAL DIP COAT, 10%	3.3 MH	2	1	04201190			CAMBION 60101771	553-3635-43-02-00	
	L 1,2									
010200	INDUCTOR, RADIAL DIP COAT, 10%	10 MH	2	1	04201828			CAMBION 60101771	553-3635-49-02-00	
	L 3,4									
010300	IC, LINEAR, OP AMP, LOW NOISE, 8-PIN DIP		2	1	00705327			SIGNETICS 60101052	NE5534AN	
	U 1,8									

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, PREAMP & WEIGHTING (A3) 0194CE

PART/DRAWING # 20011789

DWG SIZE D | DWG REV C | P/L REV E

PREP RHC 01/10/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SZ	DR IRV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
010400	IC, CMOS, QUAD ANALOG TRANSMISSION GATE U 15	1		00700039			SILICONIX 60100971	DG201CJ	
010500	IC, LINEAR, DUAL OP AMP,BI-FET LOW NOISE U 2,3,5	3		00703264			TI SEMI 60100898	TL072CP	
010600	IC, LINEAR, DUAL LOW PWR BI-FET OP AMP U 12	1		00702050			TI SEMI 60100898	TL062CP	
010700	IC, LINEAR, QUAD OP AMP, BI-FET, LOW NOISE U 4,6,7,9,10,11	6		00705996			TI SEMI 60100898	TL074CN	
010800	IC, LINEAR, TONE DECODER/PLL U 13	1		00700179			SIGNETICS 60101052	NE567N	
010900	IC, LINEAR, +5V +/-5% REG, TO-92 U 14	1		00703108			FCHILDSEMI 60100880	UA78L05AWC	
011000	TRANSISTOR, NPN AMPLIFIER Q 1,2	2		00500868			MOTO SEMI 60100872	MPS6521	
011100	TRANSISTOR, PNP AMPLIFIER Q 3	1		00500876			MOTO SEMI 60100872	MPS6523	
011200	TRANSISTOR, NPN GP Q 4,5,6,7	4		00500074			MOTO SEMI 60100872	MPSA05	
011300	DIODE, SIGNAL D 1-5	5		04000816			GE SEMI 60103405	1N4148	
011400	DIODE, ZENER, 10V +/-10% D 6	1		04000972			MOTO SEMI 60100872	1N5240	
011500	RELAY, PC MOUNT 1 FORM C, 24 VDC COIL K 1,2,3	3		01300425			ITT COMPON 60102233	HZ24HS	
011600	SWITCH, ROTARY PC MOUNT: 3 DECKS, 6 POLE 5 POS S 1	1		01102862	A	A	WILCOM 60000015	0194-C	
011700	SWITCH, ROTARY PC MOUNT: 2 DECKS, 2 POLE 7 POS S 2	1		01102854	A	A	WILCOM 60000015	0194-C	
011800	MASS TERM HDR, STR (LO PRO) 10 POS J 4	1		05202148			3M ELEX 60102027	3491-2002	

PARTS LIST

TITLE OR DESCRIPTION

PART/DRAWING # | DWG SIZE | DWG REV | P/L REV

PC ASSY, PREAMP & WEIGHTING (A3) 0194CE | 20011789 | D | C | E

PREP RHC 01/10/80
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
011900	HEADER, STR POST, .100 OC	4 POS	1	05201652			AMP	87348-4	
	J 3						60100062		
012000	HEADER, STR POST, .100 OC	6 POS	2	05200332			AMP	87348-6	
	J 2,5						60100062		
012100	HEADER, STR POST, .100 OC	10 POS	1	05200316			AMP	1-87348-0	
	J 1						60100062		
012110	SCHEMATIC, PREAMP & WEIGHTING CIRCUIT	REF		50007517	D	C	WILCOM	0194-CE-	
							60000015		

******* END OF PARTS LIST *******

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, SEND AMPLIFIER (45) 0194CE

PART/DRAWING # 20011805

DWG SIZE: C | DWG REV: C | P/L REV: E

PREP RLF 09/14/79
CHECK EMB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR REV	SOURCE INFORMATION: MFR NAME/NO.	MFR PART NO.		ECO NO.
000100	PC BOARD, SEND AMP		1	1	00904219	C	1B	WILCOM 60000015	0194-C		
000200	SOLDER MASK FOR 00904219, SEND AMP		REF	1	50007483	C	1B	WILCOM 60000015	0194-C -		
000300	RESISTOR, STABLE FILM: 1%, .25W R 40	10.0 OHM	1	1	00100206			TRW/IRC 60100781	T055	10.0 OHM	1239
000400	RESISTOR, STABLE FILM: 1%, .25W R 19	31.6 OHM	1	1	00108704			TRW/IRC 60100781	T055	31.6 OHM	
000600	RESISTOR, STABLE FILM: 1%, .25W R 18	68.1 OHM	1	1	00109850			TRW/IRC 60100781	T055	68.1 OHM	
000700	RESISTOR STABLE FILM: 1%, .25W R 41	187 OHM	1	1	00114918			TRW/IRC 60100781	T055	187 OHM	1239
000800	RESISTOR, STABLE FILM: 1%, .25W R 17	215 OHM	1	1	00108944			TRW/IRC 60100781	T055	215 OHM	
000900	RESISTOR, STABLE FILM: 1%, .25W R 38,39	374 OHM	2	1	00110122			TRW/IRC 60100781	T055	374 OHM	1239
001000	RESISTOR, STABLE FILM: 1%, .25W R 10	402 OHM	1	1	00110163			TRW/IRC 60100781	T055	402 OHM	
001100	RESISTOR, STABLE FILM: 1%, .25W R 9	453 OHM	1	1	00108845			TRW/IRC 60100781	T055	453 OHM	
001200	RESISTOR, STABLE FILM: 1%, .25W R 8	511 OHM	1	1	00108951			TRW/IRC 60100781	T055	511 OHM	
001300	RESISTOR, STABLE FILM: 1%, .25W R 7	576 OHM	1	1	00109033			TRW/IRC 60100781	T055	576 OHM	
001500	RESISTOR, STABLE FILM: 1%, .25W R 6,42	649 OHM	2	1	00109991			TRW/IRC 60100781	T055	649 OHM	1239
001600	RESISTOR, STABLE FILM: 1%, .25W R 16	681 OHM	1	1	00110023			TRW/IRC 60100781	T055	681 OHM	
001700	RESISTOR, STABLE FILM: 1%, .25W R 5	715 OHM	1	1	00110072			TRW/IRC 60100781	T055	715 OHM	

P A R T S L I S T

TITLE OR DESCRIPTION

PC ASSY, SEND AMPLIFIER (A5) 0194CE

PART/DRAWING # 20011805

DWG SIZE	C
DWG REV	C
P/L REV	E
PREP	RLF 09/14/79
CHECK	EHB 03/14/80
APRVD	RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
001800	RESISTOR, STABLE FILM: 1%, .25W	806 OHM	1	1	00101220			TRW/IRC 60100781	T055 806 OHM	
	R 4									
001900	RESISTOR, STABLE FILM: 1%, .25W	909 OHM	1	1	00109108			TRW/IRC 60100781	T055 909 OHM	
	R 3									
002000	RESISTOR, STABLE FILM: 1%, .25W	1.00 K	2	1	00109157			TRW/IRC 60100781	T055 1.00 K	
	R 36,37									
002100	RESISTOR, STABLE FILM: 1%, .25W	1.02 K	1	1	00109207			TRW/IRC 60100781	T055 1.02 K	
	R 2									
002200	RESISTOR, STABLE FILM: 1%, .25W	1.15 K	1	1	00109264			TRW/IRC 60100781	T055 1.15 K	
	R 1									
002300	RESISTOR, STABLE FILM: 1%, .25W	2.15 K	1	1	00109199			TRW/IRC 60100781	T055 2.15 K	
	R 15									
002400	RESISTOR, STABLE FILM: 1%, .25W	2.49 K	1	1	00109298			TRW/IRC 60100781	T055 2.49 K	1239
	R 13									
002450	RESISTOR, STABLE FILM: 1%, .25W	2.61 K	1	1	00110239			TRW/IRC 60100781	T055 2.61 K	1239
	R 43									
002500	RESISTOR, STABLE FILM: 1%, .25W	3.32 K	1	1	00110379			TRW/IRC 60100781	T055 3.32 K	
	R 11									
002600	RESISTOR, STABLE FILM: 1%, .25W	6.81 K	1	1	00110726			TRW/IRC 60100781	T055 6.81 K	
	R 10									
002700	RESISTOR, STABLE FILM: 1%, .25W	10.0 K	4	1	00102061			TRW/IRC 60100781	T055 10.0 K	
	R 24,25,30,31									
002800	RESISTOR, STABLE FILM: 1%, .25W	16.2 K	1	1	00110718			TRW/IRC 60100781	T055 16.2 K	1239
	R 44									
002850	RESISTOR, STABLE FILM: 1%, .25W	46.4 K	1	1	00109751			TRW/IRC 60100781	T055 46.4 K	1239
	R 47									
002900	RESISTOR, STABLE FILM: 1%, .25W	49.9 K	1	1	00102624			TRW/IRC 60100781	T055 49.9 K	1239
	R 12									
002950	RESISTOR, STABLE FILM: 1%, .25W	100 K	1	1	00111153			TRW/IRC 60100781	T055 100 K	1239
	R 46									

P A R T S L I S T

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
					PREP RLF	09/14/79
PC ASSY, SEND AMPLIFIER (AS) 0194CE	20011805	C	C	E	CHECK EHB	03/14/80
					APRVD RHC	03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
003000	RESISTOR, STABLE FILM: 5%, .25W	15 OHM	2	1	00103804			TRW/IRC 60100781	RG1/4	15 OHM	
	R 23,35										
003100	RESISTOR, STABLE FILM: 5%, .25W	470 OHM	1	1	00104018			TRW/IRC 60100781	RG1/4	470 OHM	
	R 32										
003150	RESISTOR, STABLE FILM: 5%, .25W	1.5 K	1	1	00104117			TRW/IRC 60100781	RG1/4	1.5 K	
	R 22										
003160	RESISTOR, STABLE FILM: 5%, .25W	4.7 K	1	1	00104216			TRW/IRC 60100781	RG1/4	4.7 K	11239
	R 50										
003175	RESISTOR, STABLE FILM: 5%, .25W	5.6 K	1	1	00104232			TRW/IRC 60100781	RG1/4	5.6 K	11542
	R 45										
003200	RESISTOR, STABLE FILM: 5%, .25W	10 K	4	1	00104281			TRW/IRC 60100781	RG1/4	10 K	11239
	R 20,48,49,53										
003250	RESISTOR, STABLE FILM: 5%, .25W	47 K	2	1	00104406			TRW/IRC 60100781	RG1/4	47 K	11239
	R 51,52										
003300	RESISTOR, STABLE FILM: 5%, .25W	100 K	1	1	00104463			TRW/IRC 60100781	RG1/4	100 K	11239
	R 33										
003350	POT, TRIM: RECT, 15T	1 K	1	1	00108027			BOURNS 60101649	3006P-1-102		
	R 21										
003400	POT, TRIM: RECT, 15T	50 K	1	1	00108324			BOURNS 60101649	3006P-1-503		
	R 34										
003450	CAPACITOR, MICA, DM15: 2%, 500V	43 PF	1	1	00315101			CDE 60101615	CD15FD430G03		11422
	C 12										
003475	CAPACITOR, RADIAL MONO: 20%, 50V, Z5U	.1 UF	1	1	00302190			SPRAGUE 60100690	1C25Z5U104M050B		11542
	C 13										
003500	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V	10 UF	5	1	00301937			ITT SEMI 60101029	TAP-A10K35		11239
	C 1,2,4,9,10										
003550	CAPACITOR, DISC: 10%, 500V, X5F	200 PF	1	1	00300244			EIA STD 60107604	CC0301X5F201K501-DFF		11239
	C 11										
003600	CAPACITOR, DISC: 10%, 500V, X5F	1000 PF	2	1	00300368			MURATA ER 60100310	DD61B10X5F102K500V		
	C 6,7										

P A R T S L I S T

TITLE OR DESCRIPTION

PREP RLF 09/14/79

PART/DRAWING #	DWG SIZE	DWG REV	P/L REV	
20011805	C	C	E	CHECK EMB 03/14/80
				APRVD RHC 03/14/80

PC ASSY, SEND AMPLIFIER (45) 0194CE

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANT	ST	WILCOM PART/DWG	ORI SZ	ORI REV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
003700	CAPACITOR, ALUM ELECT: AXIAL, 40V	220 UF	1	1	00301556	-	-	SIEMENS	B 41283-A7227-T	
	C 3				60100658					
003750	CAPACITOR, CERAMIC (LEADS .25 OC)	SEL	2	1	00305789	-	-	NOTE	VALUE DET AT TEST	
	C 5,A				60103975					
003800	IC, LINEAR, BI-FET OP AMP, 8-PIN DIP		1	1	00701813	-	-	TI SEMI	TL081CP	1239
	U 1				60100898					
003850	IC, LINEAR, DUAL BI-FET		1	1	00702043	-	-	TI SEMI	TL082CP	1239
	U 2				60100899					
003900	IC, CMOS: ANALOG SWITCH, DUAL SPDT		1	1	00706002	-	-	SILICONIX	DG303CJ	1239
	U 3				60100971					
004000	IC, LINEAR, OP AMP, LOW NOISE, 8-PIN DIP		2	1	00705327	-	-	SIGNETICS	NE5534AN	
	U 4,5				60101052					
004050	TRANSISTOR, PNP GP		1	1	00500017	-	-	MOTO SEMI	MPSA55	1239
	Q 1				60100872					
004100	SWITCH, ROTARY PC MOUNT, 2 DECKS, 4 POLE 3 POS		1	1	01102797	A	-	WILCOM	0194-C	
	S 3				60000015					
004200	SWITCH, ROTARY PC MOUNT: 1 DECK, 1 POLE 7 POS		1	1	01102839	A	A	WILCOM	0194-C	
	S 2				60000015					
004300	SWITCH, ROTARY PC MOUNT: 1 DECK, 1 POLE 11 POS		1	1	01102847	A	-	WILCOM	0194-C	1529
	S 1				60000015					
004400	HEADER, STR POST, .100 OC	8 POS	1	1	05200290	-	-	AMP	87348-8	
	J 3				60100062					
004500	HEADER, STR POST, .100 OC	4 POS	1	1	05201652	-	-	AMP	87348-4	
	J 2				60100062					
004550	HEADER, STR POST, .100 OC	10 POS	1	1	05200316	-	-	AMP	1-87348-0	
	J 4				60100062					
004600	MASS TERM HDR, STR (LO PRO) 10 POS		1	1	05202148	-	-	3M ELEX	3491-2002	
	J 1				60102027					
004650	BUS WIRE, 22AWG		A/R	-	04800694	-	-	BELDEN	8021	
					60101250					

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, SEND AMPLIFIER (AS) 0194CE

PART/DRAWING # 20011805

DWG SIZE C

DWG REV C

P/L REV E

PREP RLF 09/14/79

CHECK EHB 03/14/80

APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DP SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
0047001	SCHEMATIC, SEND AMPLIFIER	REF		50007475	C	C	WILCOM 60000015	0194-CE-	

******* END OF PARTS LIST *******

PARTS LIST

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
PC ASSEMBLY, OSCILLATOR (A6) 0194CE	20011813	C	A	A	PREP RFL	09/17/79
					CHECK EHB	03/14/80
					APRVD RHC	03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
0001001	PC BOARD, OSCILLATOR		1	1	00904193	C	-	WILCOM 60000015	0194-C		
0002001	SOLDER MASK FOR 00904193, OSCILLATOR		REF	1	50007467	C	-	WILCOM 60000015	0194-C	-	
0003001	BRACKET, OSCILLATOR ASSY		1	1	04411328	B	-	WILCOM 60000015	0194-C		
0004001	RESISTOR, STABLE FILM: 1%, .25W	909 OHM	2	1	00109108			TRW/IRC 60100781	T055	909 OHM	
	R 6,14										
0005001	RESISTOR, STABLE FILM: 1%, .25W	10.0 K	9	1	00102061			TRW/IRC 60100781	T055	10.0 K	
	R 5,12,13,21,27,28,33,34,35										
0006001	RESISTOR, STABLE FILM: 1%, .25W	12.7 K	1	1	00110593			TRW/IRC 60100781	T055	12.7 K	
	R 16										
0007001	RESISTOR, STABLE FILM: 1%, .25W	13.7 K	1	1	00102152			TRW/IRC 60100781	T055	13.7 K	
	R 1										
0008001	RESISTOR, STABLE FILM: 1%, .25W	20.0 K	3	1	00109603			TRW/IRC 60100781	T055	20.0 K	
	R 25,26,32										
0009001	RESISTOR, STABLE FILM: 1%, .25W	27.4 K	1	1	00110825			TRW/IRC 60100781	T055	27.4 K	1239
	R 31										
0010001	RESISTOR, STABLE FILM: 1%, .25W	38.3 K	1	1	00109637			TRW/IRC 60100781	T055	38.3 K	
	R 18										
0011001	RESISTOR, STABLE FILM: 1%, .25W	41.2 K	1	1	00102541			TRW/IRC 60100781	T055	41.2 K	
	R 2										
0012001	RESISTOR, STABLE FILM: 1%, .25W	78.7 K	1	1	00111112			TRW/IRC 60100781	T055	78.7 K	
	R 20										
0013001	RESISTOR, STABLE FILM: 1%, .25W	84.5 K	1	1	00102806			TRW/IRC 60100781	T055	84.5 K	
	R 3										
0014001	POT, TRIM: 3/8 SQ E/A, 18T	2 K	1	1	00114041			BECK/HELI 60101417	68XR2K		
	R 15										
0015001	POT, TRIM: 3/8 SQ E/A, 18T	5 K	2	1	00113829			BECK/HELI 60101417	68XR5K		
	R 17,30										

PARTS LIST

TITLE OR DESCRIPTION

PC ASSEMBLY, OSCILLATOR (A6) 0194CE

PART/DRAWING # 20011813

DWG SIZE: C

DWG REV: A

P/L REV: A

PREP REL 09/17/79

CHECK EHB 03/14/80

APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
001600	POT, CTRL: 5/8 SQ, 1T DUAL 10 K R 4A,4B		1	1	00108563			BOURNS 60101649	81A2A828A15/A15	
001700	POT, TRIM: 3/8 SQ E/A, 18T 10 K R 10		1	1	00114173			BECK/HELI 60101417	68XR10K	
001800	RESISTOR, STABLE FILM: 5%, .25W R 11	3.3 K	1	1	00104182			TRW/IRC 60100781	RG1/4 3.3 K	
001900	RESISTOR, STABLE FILM: 5%, .25W R 10	10 K	1	1	00104281			TRW/IRC 60100781	RG1/4 10 K	
002000	RESISTOR, STABLE FILM: 5%, .25W R 29	33 K	1	1	00104372			TRW/IRC 60100781	RG1/4 33 K	
002200	RESISTOR, STABLE FILM: 5%, .25W R 7,22	2.7 MEG	2	1	00115352			TRW/IRC 60100781	RG1/4 2.7 MEG	
002300	RESISTOR, STABLE FILM: 5%, .25W R 9,24	3.3 MEG	2	1	00113175			TRW/IRC 60100781	RG1/4 3.3 MEG	
002400	RESISTOR, STABLE FILM: 5%, .25W R 8,23	4.7 MEG	2	1	00113068			TRW/IRC 60100781	RG1/4 4.7 MEG	
002500	CAPACITOR, DISC: +/-.5PF, 1KV, NPO C 1,6	3.3 PF	2	1	00300020			SPRAGUE 60100690	10TCC-V33	
002600	CAPACITOR, MICA, DM15: 5%, 500V C 5,10	43 PF	2	1	00313866			CDE 60101615	CD15ED430J03	
002700	CAPACITOR, RADIAL PE: 10%, 100V C 4,9	.047 UF	2	1	00300814			SPRAGUE 60100690	225P47391WD3	
002800	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V C 12,13	3.3 UF	2	1	00306787			ITT SEMI 60101029	TAP-A3.3K35	
002900	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V C 14-17	10 UF	4	1	00301937			ITT SEMI 60101029	TAP-A10K35	
003000	CAPACITOR, TANT ELECT: DIP RAD, 20%, 10V C 11	33 UF	1	1	00301952			ITT SEMI 60101029	TAP-A33M10	
003100	CAPACITOR, MICA, DM15: 5%, 500V C 2,7	430 PF	2	1	00313965			CDE 60101615	CD15FD431J03	

P A R T S L I S T

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
					PREP RFL	09/17/79
PC ASSEMBLY, OSCILLATOR (A6) 0194CE	20011813	C	A	A	CHECK EHB	03/14/80
					APRVD RHC	03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUANIST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
003200	CAPACITOR, MICA, DM19: 1%, 500V	4700 PF	2	00303305			CDE	CD19FD472F03	
	C 3,8						60101615		
003300	IC, LINEAR, HI SLEW RATE OP AMP		5	00701029			HARRIS SEM	HA2-2515-5	
	U 1,2,3,4,5						60100989		
003400	IC, LINEAR, LOW DRIFT 2.5V REFERENCE		1	00705764			ANALOG DEV	AD580JH	
	U 6						60103363		
003500	DIODE, SIGNAL		2	04000816			GE SEMI	1N4148	
	D 1,2						60103405		
003600	TRANSISTOR, NPN AMPLIFIER		1	00500868			MOTO SEMI	MPS6521	
	Q 1						60100872		
003700	TRANSISTOR, N-CHAN J-FET SWITCH		1	00501361			SILICONIX	J113-18	
	Q 2						60100971		
003800	SWITCH, ROTARY PC MOUNT: 4 DECKS, 4 POLE 7 POS		1	01102870	A	A	WILCOM	0194-C	
	S 1						60000015		
003900	MASS TERM HDR, STR (LO PRO) 10 POS		1	05202148			3M ELEX	3491-2002	
							60102027		
004000	BRACKET, TUNING POT		1	04411351	A	-	WILCOM	0194-C	
							60000015		
004100	DRIVE, REVERSE VERNIER		1	05001284	A	-	WILCOM	0194-00-146	1239
							60000015		
004200	MS, PHILLIPS, PAN HD	4-40 X .250	4	04602041	R	-	WILCOM	S P 4-40X.250	
							60000015		
004300	MS, PHILLIPS, PAN HD	6-32 X .250	3	04602124	R	-	WILCOM	S P 6-32X.250	
							60000015		
004600	LOCKWASHER, HELICAL SPRING	#4	4	04600599	R	-	WILCOM	W H 4	
							60000015		
004700	LOCKWASHER, HELICAL SPRING	#6	3	04600821	R	-	WILCOM	W H 6	
							60000015		
004800	SCHEMATIC, OSCILLATOR		REF	50007459	C	A	WILCOM	0194-CE-	
							60000015		

******* END OF PARTS LIST *******

P A R T S L I S T

TITLE OR DESCRIPTION

PC ASSY, METER CIRCUIT (A7) 0194CE

PART/DRAWING # 20011839 | DWG SIZE B | DWG REV A | P/L REV B

PREP RLF 09/13/79
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
000100	PC BOARD, METER CIRCUIT		1	1	00904185	B	-	WILCOM 60000015	0194-C		
000200	SOLDER MASK FOR 00904185, METER CIRCUIT		REF	1	50007442	C	-	WILCOM 60000015	0194-CE-		
000300	RESISTOR, TC, +3500 PPM/DEG C, 1% RT 1	1.00 K	1	1	00114017			TEL LABS 60100765	Q81		
000400	RESISTOR, STABLE FILM: 1%, .25W R 1A	3.01 K	1	1	00110296			TRW/IRC 60100781	T055	3.01 K	11389
000500	RESISTOR, STABLE FILM: 1%, .25W R 3A	4.22 K	1	1	00109496			TRW/IRC 60100781	T055	4.22 K	11389
000600	RESISTOR, STABLE FILM: 1%, .25W R 17	4.99 K	1	1	00101881			TRW/IRC 60100781	T055	4.99 K	11389
000700	RESISTOR, STABLE FILM: 1%, .25W R 2	5.49 K	1	1	00110627			TRW/IRC 60100781	T055	5.49 K	11389
000800	RESISTOR, STABLE FILM: 1%, .25W R 37	5.76 K	1	1	00101931			TRW/IRC 60100781	T055	5.76 K	11389
000900	RESISTOR, STABLE FILM: 1%, .25W R 13,22-24,28	10.0 K	5	1	00102061			TRW/IRC 60100781	T055	10.0 K	11389
001050	RESISTOR, STABLE FILM: 1%, .25W R 39	15.8 K	1	1	00110692			TRW/IRC 60100781	T055	15.8 K	11389
001100	RESISTOR, STABLE FILM: 1%, .25W R 6	16.2 K	1	1-	00110718			TRW/IRC 60100781	T055	16.2 K	11389
001200	RESISTOR, STABLE FILM: 1%, .25W R 21	20.0 K	1	1	00109403			TRW/IRC 60100781	T055	20.0 K	11389
001400	RESISTOR, STABLE FILM: 1%, .25W R 15	24.9 K	1	1	00109744			TRW/IRC 60100781	T055	24.9 K	11389
001500	RESISTOR, STABLE FILM: 1%, .25W R 3A	40.2 K	1	1	00109686			TRW/IRC 60100781	T055	40.2 K	11389
001600	RESISTOR, STABLE FILM: 1%, .25W R 10	44.2 K	1	1	00102574			TRW/IRC 60100781	T055	44.2 K	11389

P A R T S L I S T

TITLE OR DESCRIPTION: * PC ASSY, METER CIRCUIT (A7) 0194CE *

PART/DRAWING #: 20011839 | DWG SIZE: B | DWG REV: A | P/L REV: B

PREP RLF 09/13/79
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.		ECO NO.
0017001	RESISTOR, STABLE FILM: 1%, .25W R 12,14	49.9 K	2	1	00102620			TRW/IRC 60100781	T055	49.9 K	11389
0018001	RESISTOR, STABLE FILM: 1%, .25W R 27	100 K	1	1	00111153			TRW/IRC 60100781	T055	100 K	
0019001	RESISTOR, STABLE FILM: 1%, .25W R 41	604 K	1	1	00111534			TRW/IRC 60100781	T055	604 K	11389
0020001	RESISTOR, STABLE FILM: 1%, .25W R 36,40	1.00 MEG	2	1	00111617			TRW/IRC 60100781	T055	1.00 MEG	11389
0025001	RESISTOR, STABLE FILM: 5%, .25W R 29	1 K	1	1	00104083			TRW/IRC 60100781	RG1/4	1 K	11389
0026001	RESISTOR, STABLE FILM: 5%, .25W R 11	2.2 K	1	1	00104141			TRW/IRC 60100781	RG1/4	2.2 K	11389
0027001	RESISTOR, STABLE FILM: 5%, .25W R 20,25,26	4.7 K	3	1	00104216			TRW/IRC 60100781	RG1/4	4.7 K	11389
0028001	RESISTOR, STABLE FILM: 5%, .25W R 31	7.5 K	1	1	00104265			TRW/IRC 60100781	RG1/4	7.5 K	11389
0029001	RESISTOR, STABLE FILM: 5%, .25W R 19,22	10 K	2	1	00104281			TRW/IRC 60100781	RG1/4	10 K	11389
0030001	RESISTOR, STABLE FILM: 5%, .25W R 3,4,7,8,33	100 K	5	1	00104463			TRW/IRC 60100781	RG1/4	100 K	11389
0031201	POT, TRIM: 3/8 SQ E/A, 18T 5 K R 1,30		2	1	00113829			BECK/HELI 60101417	68XR5K		11389
0031401	POT, TRIM: 3/8 SQ E/A, 18T 20 K R 5		1	1	00114181			BECK/HELI 60101417	68XR20K		11389
0031601	POT, TRIM: 3/8 SQ E/A, 18T 50 K R 9,35		2	1	00114199			BECK/HELI 60101417	68XR50K		11389
0032001	CAPACITOR, TANT ELECT: DIP RAD, 10%, 35V C 1,2,5,14,15	10 UF	5	1	00301937			ITT SEMI 60101029	TAP-A10K35		11389
0033001	CAPACITOR, TANT ELECT: AXIAL, 10%, 20V C 3	1.0 UF	1	1	00301309			SPRAGUE 60100690	150D105X9020A2		11389

PARTS LIST

TITLE OR DESCRIPTION

PC ASSY, METER CIRCUIT (A7) 0194CE

PART/DRAWING # 20011839 | DWG SIZE B | DWG REV A | P/L REV B

PREP RLF 09/13/79
CHECK EHB 03/14/80
APRVD RHC 03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION		QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
003350	CAPACITOR, TANT ELECT: AXIAL, 10%, 20V C 13	2.2 UF	11		00301317			SPRAGUE 60100690	150D225X9020A2	11389
003400	CAPACITOR, DISC: 5%, 500V, N750 C 6,7	100 PF	21		00300210			EIA STD 60107604	CC0491U2J101J501	11389
003700	CAPACITOR, DISC: +/-.25PF, 500V, NPO C 4	5 PF	11		00300061			MURATA ER 60100310	DD57B10NP05R0C500V	11389
003800	CAPACITOR, DISC: 10%, 500V, X5F C 11	1000 PF	11		00300376			ERIE TECH 60100310	801-000 X5FD 102K	11389
003900	CAPACITOR, DISC: 20%, 500V, Z5U C 8	.01 UF	11		00300459			EIA STD 60107604	CC05917Z013M501	11389
004000	CAPACITOR, RADIAL MOND: 20%, 100V, Z5U C 12	.1 UF	11		00315283			MURATA ER 60100310	8131-100-Z5U 104M	11530
004100	CAPACITOR, RADIAL PE: 10%, 100V C 16	.068 UF	11		00300822			SPRAGUE 60100690	225P68391WD3	11389
004150	CAPACITOR, AXIAL MPC: 5%, 200V C 10	1.0 UF	11		00303883			WESCO 60103330	32 MPC 104 J-2	11389
004200	CAPACITOR, TANT ELECT: AXIAL, 10%, 20V C 17	10 UF	11		00301341			SPRAGUE 60100690	150D106X902082	11389
004300	TRANSISTOR, NPN GP Q 4		11		00500074			MOTO SEMI 60100872	MPSA05	11389
004400	TRANSISTOR, N-CHAN J-FET SWITCH Q 1,2		21		00500157			SILICONIX 60100971	J106-18	11389
004500	TRANSISTOR, DUAL NPN Q 3		11		00500389			MOTO SEMI 60100872	2N2919	
004600	DIODE, SIGNAL D 3-6		41		04000816			GE SEMI 60103405	1N4148	11389
004700	DIODE, SHOTTKY BARRIER D 1,2		21		04001103			H.P. 60100393	5082-2800	11389
004800	IC, LINEAR, TRUE RMS TO DC CONVERTER U 1		11		00705756			ANALOG DEV 60103363	AD536AJD	

P A R T S L I S T

TITLE OR DESCRIPTION	PART/DRAWING #	DWG SIZE	DWG REV	P/L REV		
* PC ASSY, METER CIRCUIT (A7) *	20011839				PREP RLF	09/13/79
* 0194CE *		B	A	B	CHECK EHB	03/14/80
					APRVD RHC	03/14/80

LINE NUMBER	TITLE OR DESCRIPTION / REFERENCE DESIGNATION	QUAN	ST	WILCOM PART/DWG	DR SZ	DR RV	SOURCE INFORMATION MFR NAME/NO.	MFR PART NO.	ECO NO.
004900	IC, LINEAR, DUAL LOW PWR BI-FET OP AMP	1		00702050			TI SEMI	TL062CP	1389
	U 8						60100898		
005000	IC, LINEAR, LOW POWER BI-FET OP AMP	2		00702126			TI SEMI	TL061CP	1389
	U 5,9						60100898		
005100	IC, LINEAR, DUAL OP AMP,BI-FET LOW NOISE	2		00703264			TI SEMI	TL072CP	1389
	U 3,4						60100898		
005200	IC, LINEAR, LOW DRIFT 2.5V REFERENCE	1		00705764			ANALOG DEV	AD580JH	1389
	U 7						60103363		
005300	IC, LINEAR, OP AMP, LOW NOISE, 8-PIN DIP	1		00705327			SIGNETICS	NE5534AN	1389
	U 2						60101052		
005400	IC, CMOS, DUAL RETRIGGERABLE MONO	1		00701821			MOTO SEMI	MC14538BCP	1389
	U 6						60100872		
005410	MASS TERM HDR, STR (LO PRO) 10 POS	2		05202148			3M ELEX	3491-2002	
	J 1,2						60102027		
005420	HEADER, STR POST, .100 OC 4 POS	1		05201652			AMP	87348-4	
	J 4						60100062		
005430	HEADER, STR POST, .100 OC 10 POS	1		05200316			AMP	1-87348-0	
	J 3						60100062		
005500	SCHEMATIC, METER CIRCUIT	REF		50007426	C	A	WILCOM	0194-CE-	
							60000015		

******* END OF PARTS LIST *******

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